THE

VETERINARY JOURNAL

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Editorial

A PUBLIC HEALTH NUMBER.

JUDGING from letters received and remarks which have come to us from various sources, the "Special Numbers" of the VETERINARY JOURNAL have been much appreciated by our readers, and the present time is especially appropriate for one on "Public Health." Naturally, in a Journal devoted to the interests of the veterinary profession, the part played by the Veterinary Public Health Officer comes uppermost, and it is particularly to be noted that, like his medical *confrères*, he prefers the designation "Officer" instead of that of "Inspector." The latter savours too much of the Sanitary Official, excellent in his way and in his place, but subordinate in all things to the professional man, and viewed generally with suspicion by the majority of the general public; and the Resolution brought forward at the recent Cambridge Meeting of the National Veterinary Association "that the word 'Officer' should be used in preference to the word 'Inspector' when describing the veterinary official in Public Acts and Statutes" is well worthy of the support of every member of the profession.

This month will see the introduction of the New Order which is intended to do away with the cow giving tuberculous milk, a step which the veterinary profession have advocated for years; and, as might be expected at the present time, the majority of the articles which follow in our pages encircle the subjects of meat and milk, subjects upon which there must always be close collaboration between ourselves and our human medical *confrères*.

The articles speak for themselves, and we trust that when our readers have given them attention, the September issue of the Journal will be relegated to a place on the practitioner's bookshelf, alongside its twin brother, the Special Tuberculosis Number, from which it can readily be reached down at any time for purposes of reference.

General Articles

THE GENERAL PUBLIC AND VETERINARY MEDICINE.

By WILLIAM J. HOWARTH, C.B.E., M.D.,
Medical Officer of Health, City of London.

It is almost essential if the work done by a professional body is to be assessed at its real value that the general public should be aware of the extent and nature of certain of its activities. This is the more desirable where many of the responsibilities are of a public character, for, as has been stated, "public office is a public trust." It is surprising what a wide knowledge is possessed by the average citizen of to-day of special scientific affairs of general interest. This knowledge is obtained through the daily and weekly press, or from small scientific books written in attractive style, free from technical terms and arguments, by men who are admitted experts. On the other hand, there is often found lacking in these same persons a wider appreciation of the general work done in a particular branch of science. This fact produces the anomaly of mixed sentiments, gratitude for an established fact, and sarcasm in respect of common or well-known difficulties which remain unsolved. Contrasting examples may be the appreciation, say, of the discovery of the new therapeutic remedy for diabetes, and the cynical attitude, say, in respect of the common cold, measles, or influenza.

It is probable that the work of the veterinary profession is only assessed at a partial value by the majority of people, since the modern ramifications of the science are as yet not satisfactorily recognised, and this was even more the case twenty years ago than to-day. Everybody will remember that when motors were introduced, those who only regarded the veterinary surgeon as a man who attended to the illness of live-stock (of which horses then formed a considerable part), viewed with the greatest pessimism the future of this profession. They failed to recognise the numerous side-lines (perhaps they should really be termed main-lines) which were to become prominent, provided development proceeded in a thoughtful and satisfactory manner. *That development has taken place, and one may with reason wonder whether such activities as those enumerated below are yet appreciated at their full value. If not, it becomes a matter for consideration whether the responsible professional association might not adopt some method whereby they could be made known.*

The veterinary surgeon of to-day is undoubtedly a considerable economic factor in agriculture. The scientific basis of nutrition, a

subject which has been the special concern of Professor Wood at Cambridge, does, by the process of indicating adequate and cheap food materials, enable stock to be raised at a cheaper cost ; and to the extent of this reduced cost, to supply more animals for food purposes. There are those who assert that the remedy for the present depressed state of agriculture will be found if stock-raising can be made more profitable ; at any rate it should prove a contributory factor in improved conditions.

The systematisation of Mendelian principles is a work which is making progress, and though by no means yet in a satisfactory station, certain lines have been indicated which assist in producing the most suitable animal for a defined object. Further progress will be possible as additional facts are elucidated. The professional journals and reports of veterinary and agricultural institutions indicate clearly the considerable amount of research work which is being done all over the country. The results of these investigations, when applied to the treatment of animals or the checking of epidemics, which latter, if only partially successful, reduce the losses of the agriculturalist, and in respect of his stock such losses may be total from death or partial, owing to delays which preventable illnesses cause in bringing the animals to marketable condition. The new school of Comparative Pathology must surely result in the future in discoveries of far-reaching importance. It appears to me to present the same opportunities in veterinary work as did the investigations into tropical diseases in preventable medicine a few decades back. The effects of research work are far-reaching. They stimulate the whole profession both in activity and pride, with the result that many of the unexplained conditions and phenomena become objects of attraction to all who are keen observers. Opportunities for investigation are considerable in the meat inspection branch alone. Conditions come under observation for which no adequate pathological explanation is forthcoming. How often have valuable specimens been thrown aside—sometimes with a sigh and at others without any regret—partly because no definite lines of investigation have been laid down and no centre has existed to which inquiries might be addressed with the certainty of sympathetic interest, or still less with the promise of practical investigation in suitable instances. It is reasonable to hope that this new school will stimulate work and add a new interest to pathological problems. In one of our northern universities we hear of the probability of the forthcoming establishment of a new chair, the course of study associated with which will have an important bearing upon the comparative aspect of the diseases of animals ; and here again veterinary science

will be afforded an opportunity of displaying its worth to the community.

The preventive side of veterinary work is not yet so fully appreciated by the general public as it ought to be. As in general medicine, so in veterinary medicine, the practitioners of the respective sciences are becoming more fully alive to the fact that *prevention* confers a much greater public benefit than curative work. Of course, the latter will be always necessary, but to allow either animals or human beings to be afflicted with ailments which ought to have been avoided by reasonable precautions is economically unsound. The cost of cure is not the only expense. The difference between soundness and the often only partial soundness, the result of so-called cure, is considerable. It has not been an easy matter to get the public to appreciate this aspect of medicine, which is perhaps due to the circumstances that preventive measures are a common charge against the community, whilst curative aid is a personal one ; and so long as an individual is not involved in the expense or result it is difficult to persuade him that he may possibly be the next one affected.

The veterinary surgeon is peculiarly circumstanced in preventive work, for by statute his aid has been invoked not only to assist in the prevention of disease among live-stock, but to assist in avoiding disease attacking the members of the general public through products derived from living animals. This is a great responsibility, and it is necessary to ensure that the members of the profession engaged on this work are fully acquainted with the necessary principles and practice. Great progress has been made in this direction, but it takes at least a generation for reforming influences to gain full credit for improvement. To-day there exists a diploma in Veterinary State Medicine, the curriculum for which includes special instruction in this particular class of work, and the day appears to me to have arrived when it should be essential that those who are appointed to perform these public duties should be possessed of this diploma.

The veterinary profession is displaying great interest in the elucidation of the fundamental conditions which give rise to tuberculosis ; great progress has been made in the recognition of the disease by various methods, and a truer appreciation of the value and limitations of clinical methods has been acquired, all of which tend to engender increased confidence ; whilst in meat inspection work scientific principles are replacing rule-of-thumb decisions. The requirement of the possession of the special certificate is as necessary in this connection as in others, for in my opinion the possession either of the ordinary medical or veterinary qualification is not a sufficient guarantee that the possessor is an expert in this subject.

The possession of a qualification gives some guarantee that the holder possesses the fundamental knowledge, on to which it ought to be easy to graft the necessary skill in meat inspection, and it is in this connection that either professional man possesses a great and unassailable advantage over the lay inspector.

The subject discussed in this brief and somewhat disconnected manner above could be extended, and doubtless could have been better reviewed by a veterinarian who would possess a more intimate acquaintance with the details of the profession. My object has been solely to indicate some of the spheres of activity of the veterinary surgeon in his relationship to Public Health, which the average member of the public does not yet fully appreciate.

THE POSITION OF THE VETERINARY PROFESSION IN SCOTLAND IN REGARD TO THE INSPECTION OF MILK AND MEAT.

By ARTHUR GOFTON, F.R.C.V.S.,
Chief Veterinary Inspector to the City of Edinburgh.

THE Scotsman believes that in most things he is in advance of his brethren south of the border, and that where Scotland leads England may safely and with advantage follow. In this belief the Scotsman may not always be justified, but, without fear of contradiction, it can be said that the Scottish Acts relating to Public Health are much in advance of those applicable to England. This can scarcely fail to be recognised when it is pointed out that the basal Public Health Act in force in England at the present time received the sanction of Parliament as long ago as 1875, whilst the corresponding Act applicable to Scotland was placed on the Statute Book in 1897. During the period 1875 to 1897 remarkable progress was made in the acquisition of knowledge as to the causation of disease, and, as a direct consequence, there followed a much better conception of the measures appropriate for its prevention. The later Act bears clear evidence of this.

It is beyond the scope of this article to make a comparison between the public health activities and legislation of England and Scotland. Reference has been made to the differences which exist, because it would seem to be beyond question that the greater use which has been made in Scotland of the services of the veterinary officer in public health work as compared with England is almost directly attributable to the clearer definition in the later Scottish Act of the duties and responsibilities which may competently be placed on him.

It may fairly be said that the Public Health (Scotland) Act, 1897, opened up the way for the utilisation of the veterinary surgeon in the inspection of meat and milk in Scotland. The Milk and Dairies (Scotland) Act of 1914 imposed on the veterinary officer wider and more important duties than the Act of 1897 in connection with supervision of the milk supply, but, as is well known, this Act has been in cold storage for ten years, and will only become operative as from September 1st of the current year. There can be no doubt, however, that its enforcement will result in a considerable development and extension of the veterinary public health services in Scotland.

The growth of opinion in Scotland, during the post-war years particularly, in regard to the utilisation of the veterinary officer for inspection of food is well illustrated by some of the recent Orders issued by the Scottish Board of Health under the powers contained in the Public Health (Regulations as to Foods) Act of 1907. The first regulations under this Act were made in 1908, and were concerned with foreign meat and other foodstuffs imported from overseas. They contained no reference to a veterinary officer. They were replaced, in June of the current year, by new Orders in which Local Authorities are empowered, if they think fit, to appoint the veterinary surgeon as the officer responsible for carrying out the whole of the duties of inspecting meat and foodstuffs of every description imported from overseas. Similar recognition has been given in other recent Orders relating to food and milk. To these, further reference will be made later.

In Section 43 of the Public Health (Scotland) Act, 1897, the law is laid down in relation to unsound food. This Section confers on the Medical Officer, the Sanitary Inspector and the Veterinary Surgeon, co-equal powers in regard to the inspection, examination and seizure of (*a*) any animal alive or dead ; and (*b*) any article, whether solid or liquid, provided in both cases that they are intended for the food of man and are exposed, deposited in any place, or in course of transmission for sale or of preparation for sale for that purpose. It is to be noted, however, that the veterinary surgeon must be specifically approved by the Local Authority for the purposes of Section 43 of the Act before he can competently undertake the duties of meat or food inspection. Many Local Authorities in Scotland have approved veterinary surgeons for the purposes of this Section, and, though in a great many cases they are only employed part-time and when required in connection with the inspection of meat, at least one Local Authority, which has provided a whole-time veterinary service, has considered it appropriate to place on its veterinary officers the whole responsibility of food inspection.

Although it was stated above that the powers of the three officers were co-equal in regard to the inspection and seizure of unsound foodstuffs, the Section, nevertheless, makes certain notable differentiations and confers on the veterinary officer some powers and responsibilities which are not accorded to his colleagues in the public health service. Thus, in any proceeding under the Section in regard to a living animal, the Medical Officer or Sanitary Inspector, unless he is himself a veterinary surgeon, must be accompanied by the approved veterinary surgeon. Again, in the event of seizure of the whole or part of a carcase, the owner thereof is exempt from penalty under the Act if he proves that within a reasonable time prior to seizure it was examined on the premises where the animal was slaughtered by an approved veterinary surgeon and certified by him as fit for human food. No doubt a similar certificate if granted by a medical officer would suffice to protect the owner of a carcase against penalty in the event of court proceedings following seizure under the same circumstances, but the Act contains no provision to that effect.

Further, under Sub-section 3, the Local Authority is empowered to appoint a place within its district and fix times at which the approved veterinary surgeon shall attend for the purpose of inspecting any animal alive or dead which may there be submitted to him. He is required to " examine and pass or condemn in whole or in part any animal or carcase so submitted to him." This power of condemnation after such examination is vested solely in the veterinary surgeon approved for the purposes of Section 43 of the Act. It appears to be absolute and not subject to appeal, since it is further provided that in the event of condemnation " the animal or carcase or part so condemned shall be retained and be forthwith destroyed by the Local Authority."

It has been stated that a certificate in respect of a carcase, granted prior to seizure by a veterinary surgeon approved for the purposes of Section 43, will exempt the owner thereof from penalty. It should also be stated that a similar certificate granted by any veterinary surgeon, whether or not he holds an appointment under the Act, is an equally competent defence in a court provided the carcase has been examined " as a whole carcase, including the abdominal and thoracic viscera, in such manner that the examiner shall be readily able to satisfy himself that the organs are those of the carcase under inspection." It is necessary to state that a certificate granted by a veterinary surgeon after such examination is *required* to set forth " the name of the owner, the date and hour of examination, and such particulars regarding the animal or carcase as the Local Authority may prescribe for the purpose of aiding in the subsequent identification of the same," since experience shows that certificates

granted by veterinary surgeons very rarely contain the information required by the Act.

It will be seen from what has been said that a veterinary surgeon holding an appointment under the Public Health (Scotland), Act, 1897, is endowed with the powers necessary to carry out all the duties of an inspector of meat, and in addition to control the inspection of other foodstuffs if the appointing Local Authority sees fit to entrust that responsibility to him. There can be no doubt that the position as defined by Section 43 of the Act exercised considerable influence with the Committees appointed by the Scottish Board of Health to report on the subject of meat inspection in arriving at the recommendations which they submitted to the Board. It is now well known that the Public Health (Meat) Regulations (Scotland) of 1923 and 1924 were the direct outcome of these recommendations. In Article 3 of the Regulations the position of the veterinary surgeon is clearly defined in the following terms: " No person shall be qualified to act as a Meat Inspector under these Regulations unless he is either the Medical Officer of Health of the district or a Veterinary Surgeon, or a person who, not being the Medical Officer of Health or a Veterinary Surgeon, has received special training in the work of meat inspection and prior to June 1, 1923, had not less than seven years' practical experience in that work and has obtained from the Board a certificate (which may at any time be cancelled) that he is qualified to act as a Meat Inspector in the execution of these Regulations." The direct result of the issue of these Regulations was an increase in the numbers of veterinary surgeons appointed to perform the duties of Meat Inspector by Local Authorities which previously had not so employed them.

The Scottish Board of Health adopted a similar policy in the Public Health (Oversea Meat) Regulations (Scotland) of the current year. The duty of enforcing and executing these regulations is vested in a " Responsible Officer," who may be " the Medical Officer of Health or the Veterinary Surgeon approved for the purposes of Section 43 of the Public Health (Scotland) Act, 1897, or the Meat Inspector acting under the Regulations made by the Board with respect to the inspection of meat " as the Local Authority may appoint. And similarly, in the Public Health (Unsound Food) Regulations (Scotland), 1925, which are concerned with inspection of foodstuffs other than meat from oversea, or which form part of the cargo of a ship or aircraft, the " Responsible Officer " means " such one of the following officers of a Local Authority as the Local Authority may appoint for the purposes of the Regulations, that is to say, the Medical Officer of Health or the Sanitary Inspector or the Veterinary Surgeon approved for the purposes of Section 43 of the Public Health (Scotland) Act, 1897."

With the exception of an almost negligible quantity, the whole of the imports of foreign foodstuffs arriving at the Scottish ports are discharged on to the quays at Glasgow and Leith. At the former port the veterinary officer of the city acts as " Responsible Officer " under the Oversea Meat Regulations, and at the latter he is responsible for the execution and enforcement of both sets of Regulations.

In the work of milk inspection the veterinary surgeon in Scotland has hitherto operated under the Dairies, Cowsheds and Milkshops Order of 1885 and 1899, except in one or two instances, in which Local Authorities had secured special powers under local Acts. It is notorious, however, that these Orders have never been uniformly administered. Many Local Authorities have either failed to exercise the option of making regulations under the Order, or having made regulations have been inactive in their enforcement. As a consequence the inspection of cowsheds and of dairy cattle has been by no means consistently carried out. The Milk and Dairies (Scotland) Act of 1914 revokes these Orders and imposes duties and obligations which, there are reasonable grounds for believing, will result in very material modification and improvement of these conditions. The same Act also revokes Sections 60 and 61 of the Public Health (Scotland) Act, 1897, which deal with the stoppage of milk supplies found responsible for infectious disease amongst the consumers. In one particular the Sections shortly to be revoked are worded in a curious way, since it is provided that as a preliminary to the stoppage of an infected milk supply " the medical officer shall visit the dairy . . . and if accompanied by a veterinary surgeon approved as aforesaid shall examine the animals therein." This wording is not in keeping with the obvious intention of the Section. The quotation given clearly imposes on the Medical Officer of Health the duty of examining the cattle, but the Section proceeds to place an obligation on the veterinary surgeon to report thereon. Section 18 of the Milk and Dairies (Scotland) Act, however, which takes the place of the Sections above referred to, leaves no dubiety about intention or procedure, since it provides that the Medical Officer of Health " shall, if necessary, require the veterinary surgeon to accompany him and to examine the animals therein."

Section 3 of the Milk and Dairies (Scotland) Act provides that each Local Authority may, and if required by the Scottish Board of Health shall, either singly or in combination, appoint a veterinary inspector for the purposes of the Act, who may not engage in private practice in any district in which he holds office except with the consent of the Board. This Section also makes special provision for the combination of duties of the veterinary inspector under the Act with those under the Diseases of Animals Acts, and indeed, in the case of a district

committee of a county council the Board of Health may require that the veterinary inspector appointed under the Milk and Dairies Act shall be the veterinary surgeon who already holds the appointment under the Diseases of Animals Acts.

If one may judge by the terms of the circular issued to Local Authorities by the Scottish Board of Health intimating the enforcement of the Milk and Dairies Act as from the 1st September, it is the intention of the Board to urge Local Authorities to provide for its efficient operation so far as the veterinary service is concerned. Thus the circular states : " the Board consider that for the effective working of the Act a Veterinary Inspector should be appointed by the Local Authority either singly or in combination. They regard it as of the utmost importance that wherever possible the Veterinary Inspector to be appointed should not be engaged in private practice, and in many districts the services of a whole-time inspector can only be secured by combination." It may reasonably be assumed therefore that the enforcement of the Act will result in the recruitment of additional veterinary officers for the public health services of the country.

It should be noted that the appointment of a part-time veterinary inspector under the Act must be sanctioned by the Board before the appointment can be made. But whether a part-time or a whole-time appointment be made the office must carry a salary of which the Board approves. Further, no veterinary inspector appointed under the Act is removable from office except by or with the sanction of the Board. This provision is of great importance and great value. It enables the inspector to fulfil his duties under the Act fearlessly, and he need not be deterred by the fact that in doing so he may be encroaching on personal interests.

The principal duties laid on the veterinary inspector under the Act relate to the inspection of cattle in dairies which must be inspected at least once in each year. Dairymen are required to send written notification to the Local Authority of any cow in their dairies " which appears to be suffering from any sore on the teats accompanied by suppuration or bleeding, or from any disease liable to infect or contaminate the milk, or any cow which to his knowledge is giving tuberculous milk." Inquiry by the veterinary inspector will necessarily follow notification, and he must advise as to the course to be adopted with the milk of the affected cow.

Local authorities are required to determine in writing what officer is to inspect each dairy within their area. Dairy, as defined in the Act, includes creamery, farm, farmhouse, cowshed, byre, milk store, milkshop, etc. The officer may be the Medical Officer of Health or the Sanitary Inspector or the Veterinary Inspector, or any other duly

authorised officer. In determining the duties of the veterinary inspector, it may be that some Local Authorities, with a view to avoiding dual administration in matters pertaining to milk, may concentrate under his control the inspection of the various classes of premises included in the comprehensive definition set forth in the Act. But it is also without question that in many cases one of the other officers specified will be delegated to maintain supervision over premises in which milk is sold, or is subjected to various processes in preparation for sale as well as those used in the making of butter, cheese and other dairy products.

Local Authorities are required, subject to the approval of the Scottish Board of Health, to regulate the duties for the purposes of the Act, of the veterinary inspector or veterinary surgeon and his relation to the other officers of the Local Authority. The Board have stated that model regulations for this purpose are in course of preparation for the guidance of Local Authorities. These model regulations are not yet available for reference, but past experience has shown that the Board is disposed to be encouraging in its attitude to the veterinary officer in the public health services in Scotland.

THE *RÔLE* OF THE VETERINARY SURGEON IN PUBLIC HEALTH.

By J. POLLARD, M.R.C.V.S., D.V.S.M. (Vict.),
Veterinary Officer of Health, Halifax.

Although the veterinary surgeon in public health work at home has not the independent status of his *confrères* on the Continent, nevertheless he has a definite *rôle*, and important duties to carry out which his training has befitted him.

The unfortunate part is the severe disadvantage the veterinary surgeon is placed in through not being a statutory officer under the Public Health Act 1875 in England, which governs most of the sections relating to food inspection ; therefore he has to be graded as a sanitary inspector to carry out those duties.

In food inspection, thanks to the pioneer work of the late Professor Whalley, the veterinarian has proved his ability, whether in the examination of foodstuffs generally, or that in which his training has specially equipped him for, namely the examination of meat. The veterinary profession is greatly indebted to the enthusiasm and interest of the late Mr. S. Locke, M.R.C.V.S., who as a member of the Manchester City Council urged their claim for recognition in public health work in England.

When one recollects the state of affairs as revealed by a Parlia-

mentary report following the report of the Royal Commission on tuberculosis in 1898, where men were holding appointments as meat inspectors without any training in pathology or bacteriology, it will be obvious there was great room for improvement in the interest of public welfare.

Departmental committees on meat inspection were formed in Scotland (1920) and England, when veterinary surgeons were invited to become members of the same; and their assistance in drafting a detailed code of instructions for the use of meat inspectors has been acknowledged, thus establishing for the first time some definite rules for guidance in meat inspection. An achievement to be proud of, and one which redounds to the credit of the veterinary profession.

The departmental committees recommended that the veterinary surgeon should be a statutory officer along with the Medical Officer of Health, but the amendment accepted by the Minister of Agriculture in the Bovine Tuberculosis Order has modified this, and " competent officer " has been substituted. In Scotland the veterinary surgeon is recognised as a statutory officer for meat inspection.

But it is in the production of milk where the veterinarian probably renders the greatest service in public health. Milk is a food partaken by children chiefly in a raw state, and it is essential that such milk should be pure and free from tubercle bacilli.

From the scant attention the question of tuberculous milk has received generally, I have wondered whether, in the Medical Schools, the teaching of this disease being transmissible to man, in particular to children, was up to date.

Dr. Stanley Griffiths, with his statistics, has left no doubt in regard to the dangers on that point.

It has been left to the large towns to take action in protecting their citizens against tuberculous milk, even to the extent of going outside their areas. If any serious effort was made to secure a safe milk supply it would necessitate a quarterly examination of all milch cows in the country whose milk is sold for human consumption.

According to a report in the Press the new Milk and Dairies' Order provides for one examination annually.

During the outbreaks of foot-and-mouth disease, the question of milk supply from infected herds was left to the discretion of the Medical Officers of Health, but in practice was controlled by veterinary surgeons.

In the construction and the remodelling of cowsheds the training the veterinary surgeon has received in hygiene has proved of inestimable value to stockowners and the community generally. These are not all the duties a veterinary surgeon in Public Health has to carry out,

as in some towns they carry out the bacteriological examinations of milk for clean milk tests; and it will be seen that he has played no small part in improving the standard of the food supply of the country.

Much has been written on the need of uniformity in administration of regulations whether in meat or milk. In my opinion the solution of the problem is the establishment of a Veterinary Staff on the Ministry of Health, whose duty it would be to visit the various authorities, and who would be responsible for the way these meat and milk regulations were carried out.

SOME QUESTIONS OF MEDICAL AND VETERINARY INTEREST.

By JOHN ROBERTSON, M.D., B.Sc.,
Medical Officer of Health, Birmingham.

It seems to me that we need to revise our opinions on many problems in which the doctor and the veterinarian are intimately concerned.

Fifty years ago, when the great Public Health Act of 1875 became law, our knowledge on many points which concern both professions was much less perfect than it is to-day, yet many of us—one might almost say most of us—act on the information which was available then. In many respects it was good, but the reason for our action was on a wrong foundation. I will take two illustrations, viz., Meat Inspection and the Tuberculosis Question.

Meat Inspection.—Every one will admit that it is necessary to prevent diseased meat getting into circulation, and for this purpose that meat inspection is necessary. Most of us have an opinion that such meat will almost certainly cause illness in the human subject. My own experience as a health officer in large towns, in which one took a real interest in meat inspection while at the same time getting to know a great deal about illnesses caused by food, leads me to say that I have never known the diseased meat which one usually finds in slaughterhouses producing ill-effects in the human subject. I want at once to say that I, like others, have the same repugnance at a suggestion that I should ever be given meat from a diseased animal to eat, but the reason one has such a repugnance to the thought is purely a sentimental or æsthetic one, and not due to any experience which I have had or observed in others.

On several occasions we have found that the carcase of an animal infected with anthrax has been cut up, sold, and eaten before the nature of the case was ascertained. Many butchers and hide mer-

chants have been infected during the operation of handling these hides, but in practice even this deadly infection apparently does little or no harm to those consuming the cooked meat.

I have been informed that among certain tribes in South America the carcases of anthrax-infected animals are regularly consumed. The danger in handling these carcases is very great, but I have never heard of anthrax having been caused by consumption of the cooked meat in this or in any other country.

My point is that we should condemn these carcases because of the danger to those handling the meat, rather than to those who may consume it. Laboratory experiments on the thermal death-point of sporing anthrax bacilli would indicate that there is a great danger in consuming the cooked meat from an anthrax-infected animal, but obviously the laboratory indications are not justified in practice.

Again, tubercle-infected meat is abhorrent to the ordinary individual. When some 25 or 30 per cent. of bovines have tuberculosis, it is probable that at least once a week all of us eat some meat from animals that have been infected to a greater or lesser degree.

All of us have to pass animals with some amount of tuberculosis. I admit that it is difficult to exclude meat as a cause of some cases of human tubercle, but most medical men who have large experience in investigating the cause of human tuberculosis have no doubt in asserting that meat from tubercular animals plays, if any, a negligible part in the causation of the disease in man. I am sure it is wise to prevent meat from acute tuberculosis in animals and from animals suffering from extreme emaciation being passed for human food, but we ought to do this for the reasons that it is repugnant to eat such meat and not because it is positively dangerous. Here, again, the laboratory indications would lead us to expect infection taking place, but none of us can get evidence of such infection in practice. I might illustrate my contention from many other diseases, but these must suffice for the present.

I am, of course, aware that I am on dangerous ground in making these assertions, but I hope that I have safeguarded myself sufficiently.

On the other hand, I have had to investigate a large number of cases of illness in the human subject due to infected prepared foods. The so-called meat poisoning is a regular and even common occurrence in our large towns. In every case that I have had to deal with the infection occurred after the animal had been slaughtered, and usually after the meat or meat derivatives have been cooked. Very often there was obvious contamination from the bowel content of animals, such as may happen when sausages or brawn are made in close proximity to the place where the sausage skins are prepared.

The practical point which emerges from my experience and from my reading is that the real danger begins when meat and meat products are prepared and cooked, and when these operations are carried out in improper places, or when such cooked articles are stored under conditions which render them liable to contamination. We need, then, to devote much more attention to places where meats are prepared, cooked, and stored. Standards are needed for such places. This work is even more important than slaughterhouse inspection, but as yet little attention is devoted to it.

In several countries slaughterhouse construction, regulation, and meat inspection have been developed to such a degree of perfection that little improvement can be possible, yet in some of these countries meat poisoning is of common occurrence, due to lack of appreciation of the need of equal standards of efficiency in the cooking, preparing, and storage of meat-containing foods.

Before we deal with slaughterhouse reform in England—a very popular subject—we need to clear our minds as to the dangers involved in the preparation and storage of cooked foods. In particular, such preparation and storage should be done in places where subsequent contamination is for practical purposes impossible. This alone should be our guiding principle.

The Tuberculosis Question.—Here, again, we are agreed that bovine tuberculosis is a considerable source of loss to the agriculturist and to the meat trade. It is a real danger to the human subject from the spread of infection due to infected milk.

A few herds have been freed by the owner at great expense, but for practical purposes nothing has been done to eradicate tubercle from dairy herds ; yet we now know the conditions under which the disease is developed, viz. infection and a suitable soil. We keep the majority of our dairy cows in dark, ill-ventilated sheds, we milk these cows two or three times a day—an exhausting process—and in many cases we underfeed them.

These are just the conditions in which it will be impossible to eradicate the predisposing constitutional conditions—the suitable soil for the bacillus. I have seen on more than one occasion the extraordinary rapidity with which tubercle infection spreads in what was a tubercle-free herd when infection is introduced. Other observers have had similar experience in badly-ventilated, crowded, and dark cowsheds. I have no hesitation in asserting that at most dairy farms we are unwittingly doing our best to propagate tuberculosis infection.

Similar conditions in the human subject constitute the great cause of tuberculosis, and the removal of some of these conditions has been

the main cause of the reduction in the incidence and mortality from human tuberculosis in recent years.

It seems to me to be a more or less hopeless proceeding to attempt to eliminate tuberculosis in dairy herds by testing while we leave untouched the environmental conditions of bad housing and bad feeding. I am, of course, fully aware of the farmer's difficulties. He lacks knowledge on these matters, and therefore does not appreciate the needs, and he has also in a great many cases a substantial difficulty in getting the necessary alterations carried out by his own capital or that of his landlord.

I doubt whether 800 cubic feet of air space is the proper standard to adopt. Such a standard would be inadequate in the case of human beings. We have found that floor space and ventilation are the important points for attention. Cows should be separated in the sheds as in the case of human beings if mouth and nose infection is to be prevented. Really good lighting and ventilation are also needed.

I have been impressed during many years at the number of farmers who feed their cows on a more or less starvation diet. Washed-out hay is often used, and insufficient meal is given, as well as very limited amounts of other foods. Their whole idea is to feed in the cheapest way possible.

Now there has been no single change in the case of the human subject which has on the whole produced such satisfactory results in warding off tuberculosis as that of the better feeding of the people. Well-fed animals in good sheds are much less likely to develop tubercle than those lacking these benefits.

I am convinced that the Tuberculosis Order when brought fully into operation (and this will take some years to accomplish) will be a powerful help in reducing bovine tubercle, but more is needed.

(1) The veterinary profession must be convinced of the necessity for much better cowsheds than are provided at present.

(2) The farmer must know the predisposing causes of tuberculosis and be able to avoid them at his farm.

If such a combination can be effected, I have little doubt that bovine tuberculosis could in course of time be reduced to a vanishing point. The case of the bovine infection will be easier to deal with than the same disease in man, for we have the enormous advantage of slaughter of the highly-infecting animal.

Are we not concentrating too much on testing and slaughter at the present time, and not devoting enough attention to the more difficult but equally important question of the cows' environment and food ?

DOMESTICATED ANIMALS AS SOURCES OF BACILLI PATHOGENIC TO MAN.

By WILLIAM G. SAVAGE, B.Sc., M.D. (Lond.),
County Medical Officer of Health, Somerset. Honorary Fellow of the Mid-West and South Wales Veterinary Association.

EPIDEMIOLOGY is a many-sided subject ; one aspect of it of special interest to those who approach it from the bacteriological point of view is the problem of the reservoirs of the bacilli which are concerned with infectious diseases. Outbreaks of infectious disease of bacterial origin occur which seemingly have no connection with preceding cases, and yet, since most of us believe that bacteria breed true, the organisms must have come from somewhere. Apart from the possibility of their development from ordinary non-parasitic types, only three explanations are possible. One is that the bacteria have been passing a parasitic but non-pathogenic existence in human beings, from which they have been transferred to other human hosts which either lack the necessary immunity, or which, from causes unknown to us, stimulate the transferred organism to the acquisition of enhanced virulence and the ability to invade the tissues. A second possibility is that the bacteria are capable of passing a saprophytic existence in soil, water or other medium from which they pass by natural channels to man, to there repeat their pathogenic rôle. A third possibility is that some of these organisms are not confined to man, but are also found in animals in which they either play a specific pathological rôle, or exist as organisms undetrimental to the animal host which harbours them.

While we have clear evidence that all three explanations are operative when we study the data available for the individual diseases it is evident that these explanations are very differently applicable, and that for some diseases there are very large gaps in our knowledge.

Taking the second possibility—a saprophytic existence in the environment of man and animals—while we have evidence of its truth accumulated knowledge reduces the importance of this factor. It is well known that *Bacillus anthracis*, *B. tetani*, and *B. botulinus* live in soil, and from this source may infect man and animals. On the other hand, the evidence shows that non-sporing pathogenic types do not live long in competition with the natural saprophytes, and the only ones of any practical importance are the resistent *B. tuberculosis*, and possibly *B. pestis* in cases of very recent and gross soil contamination in tropical countries. The others, such as *B. typhosus* or *B. diphtheriæ*, are rapidly on their way to extinction in ordinary saprophytic surroundings.

The human carrier theory has been found so important in connection

with certain diseases that there is a tendency to widen its scope beyond what the facts warrant. The long persistence of such bacilli as those of diphtheria, typhoid fever, and paratyphoid fever is well known, but there is little or no evidence for many other diseases that they are spread in this way, or that the bacteria responsible do in fact persist as carriers for any material time.

The third possibility that domestic and other animals may serve as a reservoir for bacilli pathogenic to man demands a great deal more consideration than it has even received. For some diseases the relationship has been exhaustively studied, for others the possibility has been entirely neglected. This will be made evident and the probable explanation laid bare if some classification is attempted. We can recognise the following types :—

Bacterial Diseases Common to Both Man and Animals and setting up the Same Type of Disease in Both.

Of interest to both the medical and veterinary professions, these diseases have been intensively studied, and we know much in regard to such conditions as tuberculosis, glanders, anthrax, and actinomycosis. In some of these diseases the pathological lesions are closely parallel in man and animals, but in others considerable differences are observable.

When the animals affected are not food animals, or otherwise closely associated with man, as is natural, most of the facts as to the disease are due to medical, not veterinary, investigation. Plague as it occurs in rats is a conspicuous example. The inter-relationship between these diseases and man is clearly established.

Diseases in which there are Cycles which can only be carried through in Animals of Different Type.

All our examples belong, I believe, to the animal parasites, the tapeworms and *Trichina spiralis* being conspicuous instances. The possibility that bacilli may possess two such phases has not been overlooked, but there does not appear to be any evidence in support at present.

Diseases in which the Same Organism produces Clinical Types of Disease which are Different in Man and Animals.

These form a group of extraordinary interest and raise considerations which may be of great practical importance. I have chiefly

studied the subject in connection with the bacteria concerned in human food poisoning. While the disease called limberneck in chickens may have a varied etiology, and is really a symptom rather than a definite entity, it has now been proved that cases of limberneck in chickens in a certain proportion of cases is due to infection with *B. botulinus*, the organism of human botulism. Certain outbreaks of forage poisoning in horses have the same etiology. While the symptoms in this type of forage poisoning are somewhat like those of botulism, those described as occurring in chickens differ materially. All three conditions are, however, due to infection with the same organism, and in chickens a common source of infection is from canned food spoiled by the growth of *B. botulinus*.

The relationship of the organisms of the Salmonella group to diseases in animals, or living in them in a carrier condition, is in my opinion the key to the prevention of outbreaks of human food poisoning. The majority of the outbreaks of human food poisoning, and certainly the great majority of those of any severity, are due to infection of the food with certain Salmonella bacilli strains, or the toxins of these bacilli. These outbreaks arise sporadically and at long intervals, and the precise source of the bacilli from whence the food was infected is usually unascertained. There is no evidence that the causal bacilli lead, or can lead, a saprophytic life in soil, water, or other source outside the animal body. A careful study of a very large number of human outbreaks has convinced me that infection from a human source or carrier is of the rarest, in spite of the fact that in many outbreaks this is advanced as the cause. In nearly all of such cases the evidence of a human carrier is either pure speculation or worthless. The third possibility cited above seems by far the most probable source of infection, i.e. from animal sources, and this is strengthened by the knowledge we possess that this group of organisms is a fairly common cause of disease in animals apart from man. They do not cause disease of the food-poisoning type, such as occurs in man, but most often a general septicæmia.

Mr. Bruce White and myself have spent several years recently investigating this group, but only a few points which bear upon the subject of this paper can be mentioned. While the different types of the Salmonella group have been separated and a commencement made towards a study of their distribution in nature, our knowledge of their distribution as a cause of animal diseases is as yet very incomplete. Culturally these organisms are extremely like one another, although readily separated serologically. Pathologically they play very different rôles. *B. paratyphosus B*, for example, while setting up paratyphoid fever in man, is not a cause of disease in any of the lower

animals, and seems quite harmless to them. *B. abortus equi*, on the other hand, can set up disease in horses, but seems to have no pathological part to play as regards man. The two common food-poisoning types are *B. ærtrycke* and *B. enteritidis*, and both these are pathogenic to animals. *B. ærtrycke* occurs as a widespread cause of enteritis in mice, guinea-pigs, and other rodents, causes enteritis in parrots and other birds, is occasionally found in pigs, and also as a cause of calf enteritis. *B. enteritidis* occasionally causes disease in cows and calves, and is fairly common as a cause of disease in rats. Another member of the Salmonella group is *B. suipestifer*, which only very rarely causes human food poisoning, but which is common as a secondary invader in pigs in hog cholera, and which at times is found as a primary cause of disease in pigs.

Within this one Salmonella group, consisting of organisms which are nearly indistinguishable culturally and morphologically, but clearly separable serologically, we have types which cause disease in man only, which cause disease in certain lower animals only, and which cause disease in both man and animals, the clinical types produced, however, being very different. We do not know to what extent the conditions are related, or how far certain animals act as reservoirs of these bacilli from which food may become specifically infected and so cause disease in man. In a certain proportion of cases, however, we do know this is the case, for the food-poisoning outbreak has been traced to meat of an animal suffering with a Salmonella infection, or to the milk of a cow similarly infected, or to food infected with a Salmonella strain from mice excreta. In many others, diligent inquiry fails to elucidate the source of the bacilli, and we can only surmise some unrecognised animal source. The inquirer into the source of origin of these food-poisoning bacilli consults the veterinary profession, but I am bound to confess that no helpful information has been forthcoming from that source. I mention this in no spirit of disparagement, but simply to point out the need for better co-operation and for the veterinary profession to consider the importance of the study of bacilli which, though not a cause of illness of any economic significance amongst animals, are yet pathogenic to man.

The *B. ærtrycke* type, which causes calf enteritis, outbreaks of septicæmia in mice, or illness in pigs, is identical in every way with the strains isolated from human outbreaks, and a knowledge of the animal distribution and habitat in the one would in my opinion go a long way to solve the paths of infection and so prevent the origin of outbreaks of human food poisoning. It is not a natural intestinal inhabitant of either man or animals.

DISEASES IN WHICH THE BACILLI RESPONSIBLE ACT AS PATHOGENIC ORGANISMS IN ONE TYPE OF ANIMAL, AND AS NON-PATHOGENIC PARASITES IN ANOTHER.

We have to ask ourselves if there are any such diseases. We have plenty of examples showing bacilli which are pathogenic to man, but which are harmless to the lower animals when introduced by natural methods, and *vice versa*. For example, *B. typhosus* is pathogenic to man, but causes no disease in animals. Are we, however, in a position to state that such organisms may not remain as non-pathogenic parasites in some cases ?

Theoretically there is no inherent impossibility. I am unaware of any experiments upon the duration of typhoid bacilli in the animal intestine when fed in considerable numbers, but probably they do not persist for any length of time. On the other hand, typhoid bacilli which have gained access to oysters can be recovered from them for periods varying from ten to eighteen days. There is no infection of the oysters, and the bacillli do not increase in the tissues of the oyster. Infected cockles will continue to harbour typhoid bacilli for ten days or more.

My experiments with B. *diphtheriæ* and cats showed that it was impossible to infect kittens with this organism by the natural channels, but that the bacilli very rapidly died out from the nose and throat. The same strains injected into kittens rapidly caused illness and death.

Foot-and-mouth disease is much rarer in man than the opportunities for infection would postulate, and we must assume a high relative unsusceptibility.

We know very little as to the factors which cause a failure to infect by the natural channels animals other than the favoured host. In some cases it would appear to be an unfavourable chemical environment in the intestine, in others an inability to overcome the defensive mechanism of the intestinal wall and to penetrate into the blood or lymph stream. We have abundant examples of strains which introduced parenterally even in small doses are rapidly fatal, but which are quite inocuous introduced by the mouth.

Perhaps the best example of an organism coming under this group is *Micrococcus melitensis*. This organism causes Malta fever in man, while it is well known that goats' milk in Malta and elsewhere often contains the specific organism in large numbers and is a frequent source of infection.

That organisms which have become highly specialised for one animal host may on rare occasions become pathogenic to another animal is well illustrated by my work on bovine mastitis carried out

in 1907–1909. The ordinary type of streptococcus causing bovine mastitis which I named *Streptococcus mastitis* is a bovine strain or group which readily sets up mastitis in cows or goats, but which is not a cause of human disease. This I demonstrated by swabbing my own throat on two separate occasions with massive doses. On the other hand, the very closely allied types of streptococci from human sore throat conditions were refractory as regards their ability to set up mastitis in goats when introduced via the teat passage, and when care was taken not to injure the duct lining when introducing them. It was also possible to propound from the experimental and clinical data that the considerable number of human outbreaks of sore throat due to cows suffering from mastitis were explainable on the hypothesis of a rare infection of the cows' udder with streptococci of human origin which had been able to obtain a footing and set up mastitis. American investigations carried out many years later and with improved differentiation tests have afforded striking confirmation of this hypothesis.

Here we have a clear illustration of the possibility of an organism normally specialised to a human habitat only acquiring under special conditions the facility to set up a bovine disease, and from that source serve as a focus for a widespread human outbreak of septic sore throats.

The above considerations and examples furnish grounds for certain general deductions. We have to regard the majority of the bacteria pathogenic to man or animals as organisms which have become highly specialised. They have gained intensive virulence, but at a price, paid in the form of an inability to grow or even survive, except under restricted and strictly defined conditions. This process has proceeded so far that for many of them only a few animal hosts provide their requirements, and they tend to become organisms restricted to one or more animal types. On the other hand there remain some bacteria with more generalised tastes and a greater adaptability. When the diseases they set up are well defined and of economic importance to man as regards himself, or as regards animals, these diseases are well studied by both professions, and in consequence our knowledge is extensive. When, however, their economic importance in animals is not great, and when their significance to disease in man has escaped attention, our knowledge (as is not unnatural) of the distribution of the bacilli concerned in animals and of their disease-producing propensities shows very extensive lacunæ. This lack of knowledge is particularly conspicuous as regards the Salmonella group. All these types of disease and the bacilli concerned constitute a kind of No-man's land which needs exploration urgently. I feel that much of value to public health and epidemology would accrue if this neglected field was more thoroughly surveyed.

XUM

SOME OBSERVATIONS ON THE METHOD OF INFECTION AND SPREAD OF TUBERCULOSIS IN THE BODY.

By R. P. HOLMES, F.R.C.V.S., D.V.S.M., N.D.A.,
Veterinary Officer of Health, Bolton.

The bacillus of tuberculosis gains entrance to the body by various means. Probably one of the commonest is by inhalation of the bacilli, derived from any source, but generally from an adjacent animal suffering from an open tuberculous lesion in the lungs. These bacilli may pass directly to the trachea, larger bronchi, or lungs, and be conveyed by the lymphaties to the bronchial and mediastinal glands, or they may be arrested by the moist surface of the pharnyx, and may then infect the pharyngeal lymphatic glands—a common mode of infection in pigs. Ingestion of tuberculous material is also a fruitful source of infection. In some cases the pharynx and the associated lymph glands may be affected, but the commoner sites are the intestines and the mesenteric lymphatic glands.

There are many cases of the disease, especially in bone tissue or in the brain, where the mode of infection is not at all clear. In some of these there is probably a spread from the lymph glands by means of the lymphatics ; but in other cases the blood must be regarded as the vehicle by which the bacilli are carried to various parts ; this is especially the case in some affections of bones and joints, and in tuberculosis of the testicle, the latter affection being of more common occurrence in the human subject than in our food animals.

Infection by means of abrasions or wounds of the skin is not common, though I have on record a rather interesting case of a cow being brought to the abattoir for slaughter on account of chronic lameness of the left stifle joint. I had the opportunity of examining the joint prior to and after slaughter. Ante-mortem examination revealed the presence of an original wound which had partly healed, and from which was exuding a thick yellowish sticky discharge. The joint was enlarged, and on palpation appeared nodular and indurated. I was unable to obtain any history of the case, but it appeared to be a long-standing injury, and with the exception of a stiff joint the cow appeared to move along without suffering appreciable pain. Post-mortem examination revealed the presence of definite lesions of tuberculosis, which had spread locally by direct infiltration of the tissues surrounding the joint, and on section of the irregular mass of granulation tissue several tuberculous foci were found in various stages of development and degeneration. The infection was traced along to the precrural lymphatic gland which lies in close proximity to the joint.

This gland was heavily infected, and in an advanced state of caseation. The bacilli had spread by way of the lymphatics to the glands of the hindquarter, and definite tuberculous foci were found in the popliteal, iliac, and deep inguinal lymphatic glands. The corresponding lymphatic glands of the right hindquarter appeared quite normal, and no tuberculous deposits were found in any other part of the carcase or internal organs. This appeared to me to be a typical case of infection by inoculation through an open wound which is by no means common in the lower animals. The spread of the infection in this case appears to have been in a direction opposite to that of the lymph flow.

CO-OPERATION IN MEDICAL AND VETERINARY RESEARCH.

By NATHAN RAW, C.M.G., M.D., J.P.,
London.

INTENSIVE scientific research is the order of the day throughout the civilised world. Thousands of highly skilled workers are devoting their time and energies to the great problems of how to prevent and cure diseases in man and animals, and how to apply the latest scientific discoveries to the perfection of machinery for our great commercial and manufacturing industries.

To get the best results out of all this work we must combine. Problems which are common to the two great branches of medicine must be studied together.

Until quite recently medical and veterinary workers have conducted their investigations independently of each other, with the result that some diseases which were of vital importance to both doctors and veterinarians were apt to be studied from one point of view only, instead of the broad and comprehensive outlook, which is of supreme importance for a complete knowledge of the subject.

It was for this reason that we welcomed the formation of a Comparative Medicine Section in the Royal Society of Medicine, with its Council and other officers equally divided in numbers between the members of the medical and veterinary branches of medicine respectively; the Presidents alternating in like manner on each occasion when a fresh Ruler of the Section is selected. The late Sir Clifford Allbutt was its first Medical President, and Professor Hobday is in office now as the first veterinary surgeon to hold that honour. I predict great things from this Section. It has brought together physicians, veterinarians, and pathologists to the study and

investigation of many diseases which are common to animals and man, some of which are conveyed directly to man from animals and *vice versâ*.

A large number of these affections are preventable, and a good deal of unnecessary suffering is caused, which in the light of further knowledge will be prevented.

Tuberculosis is the great example of a disease which plays havoc with both human and animal life.

This scourge is the common enemy of the whole civilised world, and although it is admitted to be preventable, the vastness and comprehensive character of its inroads into life seem to paralyse our efforts to exterminate it. Unlike cancer and foot-and-mouth disease, we know the exact cause of tuberculosis, but that is only *one* step towards its mastery, and it can only be by combined efforts of research that we will ultimately control it, as I feel sure we will.

Apart altogether from the appalling loss of human life every year from this disease, and the amount of suffering and crippling of the human race, we now realise the great part which is played by animals in the conveyance of tuberculosis from animals to man. It is estimated that in Great Britain alone we have to-day over a million dairy cows infected with tuberculosis, and that as a result of drinking infected milk some ten thousand children are lost every year.

Millions of cattle and pigs are infected at the present moment, and the financial loss to the owners and breeders cannot be estimated.

The milk problem is the most urgent and vital one to which we ought to direct all our united energies.

Foot-and-mouth disease can be eradicated by slaughter and isolation, but we cannot adopt these methods in the case of humans.

In my opinion, we can only hope to eradicate tuberculosis by prevention.

The humanisation of calves before they are infected will stamp out the disease in cattle, and so diminish the disease in humans.

A special department of veterinary medicine should form a part of every Public Health scheme, not only for the prevention of disease in animals, but for the protection of the community against these diseases which are so freely communicable from animals to man.

LINGUATULA SERRATA, "FRÖHLICH," IN BOVINE MESENTERIC LYMPHATIC GLANDS. A LESION OF INTEREST TO THE MEAT INSPECTOR.

By A. W. NOËL PILLERS, F.R.C.V.S., D.V.S.M.,
Liverpool.

In the Veterinary Journal for March (p. 126) this year I gave an account of adult pentastomes in the nasal cavities of a bull bitch. A little later Mr. H. L. Torrance, M.R.C.V.S., D.V.S.M., sent me some mesenteric lymphatic glands from a steer of Irish origin. No larval pentastomes were found in them, but the microscope revealed structures which appeared to be portions of damaged hooklets. It is well known that such hooklets can often be found in the lesions in a more or less complete form, should the larval pentastomes have previously died. On communicating this result to the sender he was good enough to forward me five uncut mesenteric lymphatic glands from another Irish steer. Each gland appeared to be about twice its normal size, and on being opened by incisions about an eighth of an inch apart at right angles to the long axis, was found to be harbouring larval pentastomes. The glands were involved to about the same extent, each having four or five parasites; about twenty complete larvæ were obtained. The cavities made by the larvæ contained one, two, or three specimens. Each larva was of a creamish-white colour, and measured on an average 5 mm. in length by 1 mm. broad. Figs. 1, 2 and 3 show the naked eye and microscopic features of the parasite. In addition to the name given in the title of this note it is known as *Pentastomum denticulatum* and *Linguatula denticulatum*. On reaching the nasal cavities of certain carnivora it becomes adult, and eggs either from the nasal discharge or fæces may infect man, in whom larval forms have been found in organs of the thoracic and abdominal cavities. It is stated by various authors that larval pentastomes occur in the sheep, goat, ox, pig, horse, rabbit, hare, guinea-pig, and rat. Although Cobbold found it here in man, I can trace no figures concerning its frequency. In addition to being found in the mesenteric lymphatic glands it also occurs under the penitoneum, in the liver, and sometimes in the lungs. As the mesenteric glands are embedded in fat, which is most often used commercially, there is not much chance of the dog becoming infected from this source. Echinococcosis is usually given as the main reason (from a human point of view) for excluding dogs by by-law from slaughterhouses; linguatuliasis would appear to be another. It is to be feared that regulations on this point are not enforced as strictly as they should be.

The lesion is of interest, inasmuch as it may be mistaken for tuberculosis. Ostertag points out that in some cases it may lead to

FIG. 1.—*Linguatula serrata.* Larvæ from Mesenteric Lymphatic Glands × approx. 2.

unjust condemnation of whole animals or quarters. The simple lesion consists of a cavity containing a brownish fluid and one or more parasites. The gland on the right-hand side of Fig. 4 shows two cavities—one large and the other small. After a while a quantity

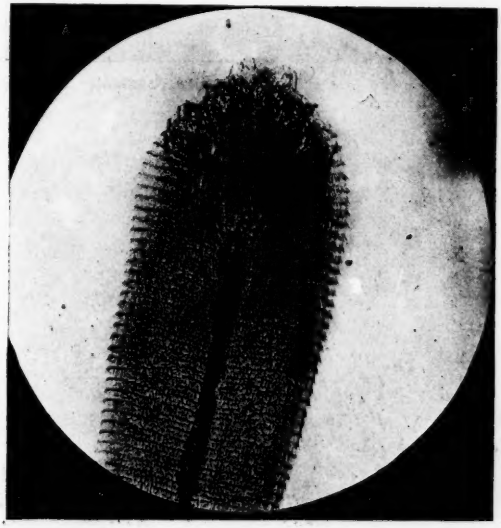

FIG. 2.—*Linguatula serrata.* Anterior Extremity of Larva × approx. 36.

of greenish-grey material partly or completely fills the cavities. The sections on the left-hand side of Fig. 4 each contain a large area of

this material, in the lower third. The lesions there shown are apparently older than those in the gland on the right. A parasite can

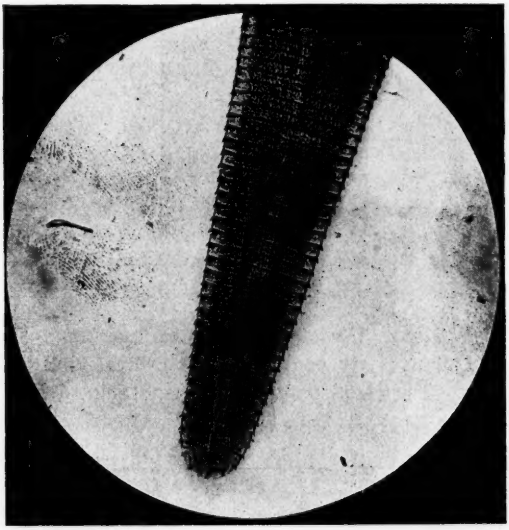

FIG. 3.—*Linguatula serrata*. Posterior Extremity of Larva × approx. 36.

FIG. 4.—Bovine Mesenteric Lymphatic Glands Transverse Sections showing Lesions due to Larvæ of *Linguatula serrata*. × approx. 2.

just be made out at the junction of the middle with the lower third of the specimen on the left of the photo. After a sojourn of some months, the larvæ normally leave the lymphatic glands, but some

may die and undergo degeneration and calcification. It is unnecessary to describe the histology of the lesions, or go into the differences between them and those of tuberculous lymphadenitis. The diseases may co-exist. In Germany meat inspectors refer to affected glands as " green spots," and they appear to be quite common in some parts. It is possible that in these islands they are not so rare as records would lead one to believe.

Since the above note has been in the printers' hands my colleague, Mr. H. T. Matthews, B.V.Sc., M.R.C.V.S., has found pentastome larvæ in the mesenteric lymphatic glands of two Irish bovines.

As in the previous cases, they were forwarded by Mr. H. L. Torrance.

The present article, therefore, deals with four cases of linguatuliasis of the mesenteric lymphatic glands in cattle.

THE INGESTION OF BOVINE TUBERCLE BACILLI IN MEAT.

By P. F. DOLAN, M.R.C.V.S., D.V.S.M.,
Chief Veterinary Inspector, Corporation of Dublin.

THE argument is very often put forward that the cooking of meat removes the danger of infection by the bovine tubercle bacillus. Pickling has also been stated to have a protective value. It is interesting to consider what protection is afforded by cooking and pickling. The first important point is that the tubercle bacillus is resistant to external influences on account of the waxy material with which it is surrounded. The best examples we have of the resistance of the tubercle bacillus is its relation to anteformin and the difficulty in staining the bacillus and the difficulty of decolorising it when it is stained.

The next important point is that meat is a poor conductor of heat. Also heat applied to cultures of the tubercle bacillus has a much higher value than the same heat applied to meat, for example, meat pies, containing tubercle bacilli.

The temperature and the time of the application of the heat necessary for the destruction of the tubercle bacillus have received great attention by a number of laboratory workers.

" In a *moist environment*, a prolonged exposure of 12 hours at 50° C., or 4 hours at 55° C., one hour at 60° C., 15 minutes at 65° C., 10 minutes at 70° C., 5 minutes at 80° C., or 1 minute at 95° C., is sufficient to destroy without fail the vitality of the bacillus *in culture suspensions*. Heat acts less rapidly on tuberculous products because of the pro-

tection afforded by the albumin. At every temperature, also, the duration of the heating is a factor of prime importance, and the degree of heat must be maintained throughout the entire mass of fluid " (Calmette).

Bang found that heating milk to 70° C. for 2 minutes was sufficient to destroy tubercle bacilli, but Delépine found that heating cream to 85° C. for 15 minutes was insufficient to destroy the tubercle bacillus with certainty.

A large number of experiments have been carried out to determine the temperatures reached in the cooking of meat, and the length of time required for certain temperatures to be reached in the interior of joints, meat pies, etc.

" Rupprect found that boiling for 45 minutes did not produce a higher temperature than 75° C., and this only in thin pieces of meat. He also determined the temperature of thoroughly boiled ham at 65° C., and sausages, which are rapidly roasted, attain a temperature of only 28·75° C " (Ostertag).

" Küchenmeister found that large pieces of so-called fresh boiled pork are heated to a temperature of not more than 60° C. after the usual half-hour period of boiling ; in the inner layers not more than 55° C. and require boiling for several hours in order to reach a temperature of 77° to 80° C " (Ostertag).

" Perroncito found that a piece of beef (8 × 10 cm.) placed and kept in boiling water was only 47° C. after 20 and only 68–70° C. after 35 minutes. A ham of about 6 kilos weight was placed in cold water which was raised to boiling-point. The water boiled when the interior of the ham was 25° C., after 35 minutes it was 35° to 40° C., and after 2 hours the temperatures in different parts of the interior were 46°, 55°, 58°, 62°, 64°, and 67° C. A ham of about 8 kilos weight treated in the same way only showed an interior temperature of 44·5° C. after 2½ hours, while after 3½ hours the temperatures varied from 62–84° C. in different parts " (Savage).

" In connection with a food-poisoning outbreak Delépine and Howarth found that the temperature of the centre of a pie said to be under-cooked, but having all the external appearances of being well baked, may not exceed 47·2° C. In an obviously over-baked and acknowledged to be so, the temperature had not reached beyond 86·6° C." (Savage).

From these and other published accounts of the experiments carried out in the cooking of meat it is evident that ordinary careful cooking, especially boiling or steaming, destroys tubercle bacilli in the superficial parts of joints and in thin pieces or slices of meat or organs. As regards the centre of joints or mince pies, etc., cooking does not

give sufficient protection, especially in careless or rapid cooking and in what is usually known as " underdone " cooking.

Diseased organs when chopped or minced and cooked in pies, etc., would be the most likely to contain living tubercle bacilli. Also the rolled flap from an animal with tuberculous peritonitis, or joints containing deep-seated lymph glands.

In connection with pickling, the experiments of Forster show that tubercle bacilli in cultures proved virulent after two months when covered with salt. Pieces of tuberculous organs finely minced also proved to be virulent after lying in salt brine for eighteen days.

" According to Klepzon, virulent tubercle bacilli have been found in tuberculous organs after six weeks' immersion in brine " (Hutyra and Marck).

On account of the large amount of chilled and frozen meat that is consumed, it is well to note that tubercle bacilli resist freezing. " According to Galtier, Cadéac and Malet, and Moussu, temperatures in the neighbourhood of minus 180° C., prolonged from a few hours to eight days with alternate freezings and thawings as well, do not affect the vitality of bacilli contained in tuberculous lesions " (Calmette).

The hanging of meat and even putrefaction have no effect on the virulence of tubercle bacilli. The virulence has been found unaffected after 167 days in decomposed cattle lung. The chilling, freezing, and hanging of meat preparatory to cooking have no adverse effect on the tubercle bacillus.

TUBERCULOSIS AND ITS ELIMINATION FROM OUR MILK SUPPLY.

By F. E. SOMER, F.R.C.V.S., D.V.S.M.,
City of Birmingham Veterinary Department.

The introduction of the Tuberculosis Order 1925 will be welcomed by many Public Health veterinarians and practitioners who come closely into contact with this disease, and who know of the ravages that may follow in its footsteps.

The incidence of tuberculosis in children proved to be of bovine origin and contracted through drinking tubercle-infected milk is very high. It is impossible to state how many cases there must be in which tuberculosis of bovine origin takes root at an early age, to lie dormant until a lowered vitality favours its spread.

The general public does not realise the advantage of a tubercle-free milk supply, and is not prepared to pay a higher price for it. One finds remarkable apathy amongst farmers when visiting their farms in connection with tubercle-infected milk samples. They do

not realise the danger there is in drinking infected milk, and when the cow producing the tubercle milk is pointed out to them, they have the idea that there is no risk in giving the milk to the calves or to the pigs without previously boiling it. During the period that the Tuberculosis Order 1914 was in abeyance, the Birmingham Corporation have had a scheme under which they paid compensation to farmers sending milk to Birmingham to encourage them to slaughter cows producing infected milk. Under the new Tuberculosis Order the various Local Authorities are now compelled to slaughter these subjects. Prior to this Order, we had no authority to get a cow producing tubercular milk slaughtered. The only control we had over such a cow was that she should be isolated and her milk not sent into Birmingham, but there was nothing to prevent her milk going into another area or to prevent her being sold in an open market for milking purposes.

It is rather interesting to look at statistics showing the incidence of tuberculosis amongst dairy cattle, and also the percentage of cows suffering from tubercular mastitis and producing tubercular milk.

During 1924 several herds were tuberculin-tested under the Birmingham Corporation Scheme for providing tubercle-free milk for Birmingham; of these, ten were herds which had not been previously tested. The results of these ten tests were :—

Herd.	Number of Cows Tested.	Number Passed.	Number Failed.	Percentage Reactors.
A	33	20	13	39
B	52	14	38	73
C	63	44	19	30
D	14	12	2	14
E	33	12	21	64
F	40	1	39	97·5
G	33	23	10	30
H	36	13	23	64
I	38	13	25	66
J	24	11	13	54
	366	163	203	55

These tests only include a comparatively small number of animals, but they give some idea of the prevalence of tuberculosis amongst our dairy herds. Herds A, C, and G contained a number of young cows and heifers which accounts for the lower percentage of reactors in these herds; incidentally most of them were home-bred, and the byres of these farms were comparatively good ones.

Herd D, showing the very small percentage of 14 per cent. reactors, is a very small herd. The sheds on this farm are by no means ideal, but the cows are under direct personal supervision of the owner, and I may add that this farmer carried off the first prize of 100 guineas given by an enterprising Birmingham milk retailing firm to the farmer supplying milk to them which gave the lowest average bacterial content over twelve months, samples being taken monthly from the churns on arrival of the milk at the depot, and submitted to bacteriological examination. The cows in this herd are practically all home-bred, and only heifers have been introduced into the herd.

Mr. Steele-Bodger, M.R.C.V.S., of Tamworth, has recently carried out a number of tests on herds tested for the first time. He tested all the female stock on five co-operative firms, and a summary of his results shows that 45·3 passed the test and 54·7 per cent. reacted. These figures correspond with our own results.

In endeavouring to rid the city from some of the tubercle-infected milk which is bound to come into the city from the agricultural area surrounding it, mixed samples are taken at the stations or milk depots every week and submitted to a biological examination. If in a month's time, when the guinea-pigs are killed, a post-mortem examination shows infection of the guinea-pig with tuberculosis, the farm the sample came from is visited and all the cows examined, after milking for preference, and individual and group samples taken as may be thought necessary. These samples are submitted to a further biological test, or if one feels sure that one particular cow has a tuberculous udder, a microscopical examination may be made first, and then if necessary submitted to biological examination.

There are many, however, who rely entirely on the biological examination; it certainly takes longer, but its results are definite.

A number of milk samples taken at random from our records read:—

Mixed samples from stations	353
Number of station samples returned + tuberculosis after guinea-pig inoculation	29
Total number of cows examined at the 29 farms the infected samples came from	739
Number of individual samples taken from suspected cows at these farms (with suspected tubercular mastitis) ..	97
Number of individual samples returned + tuberculosis ..	31

In Birmingham we make a practice of taking samples in all suspicious cases when visiting farms. It is better to err on the right side and be over-cautious and take plenty of individual samples

than to miss the cow and have to re-visit the farm. It is not at all easy to detect a tubercular mastitis in its early stages.

This system of milk sampling has been carried out in Birmingham over a number of years, and I am sure these figures would show a comparatively low percentage of infected samples compared with any district where no systematic sampling takes place.

In the city area itself all the cowsheds are registered and the sheds are visited monthly, and the cows examined, individual and mixed samples of milk being taken when thought necessary and submitted to a biological test. Here it is that one realises the difficulty of dairy inspection, for during the summer months when the cows are at grass, except at milking times, it is difficult to carry out the examination of the cows and their udders as one would wish. In city dairies little stock-rearing is done, and during the course of the year several changes occur in the herd which calls for a closer inspection.

The question of tuberculosis in cattle must also be considered from an agricultural economical point of view. We all know what bad feeders cattle are when they are infected to any extent, and I feel certain that many difficult and often unsatisfactory cases which the practitioner comes in contact with are due to tubercular lesions.

The rate at which infection may spread in a tubercle-free herd when all reactors are not removed from the herd is well recognised by veterinarians who have had experience in the establishing of tubercle-free herds.

There are quite a number of tubercle-free herds supplying tubercle-free milk to Birmingham; unfortunately amongst these there are one or two farmers who have not tackled the problem of establishing their free herd on the sound principle of immediate separation of reactors from non-reactors, and the testing of fresh cows before introduction into their herd, and the result is that they have become discouraged and given up the idea of establishing a tubercle-free herd, or are constantly getting fresh reactors. It can well be understood how the disease spreads in the ordinary herd housed under the usual unsatisfactory conditions where the number of reactors average 50 per cent.

The amount of meat that is condemned annually as unfit for human consumption due to tuberculosis must be enormous. At the City of Birmingham Abattoir during 1924, 915 complete carcases of beef were condemned as unfit for human consumption. Of these 520, or 58 per cent., were condemned on account of tuberculosis, and 395 carcases were condemned from other causes.

During the twelve months 605 tons of meat were condemned, including a large number of part carcases and offals which were condemned for tuberculosis, and it is estimated that at least 75 per cent. of this amount was condemned on account of tuberculosis.

The Tuberculosis Order does not help us to any great extent in the establishing of free herds, but it gives us power to get those animals slaughtered which are supplying tubercle-infected milk and also those which are badly affected and showing clinical symptoms of tuberculosis, and these are the cases which are most likely to spread the disease, and they are usually the " wasters " in the herd.

When one considers the number of reactors in an average herd and remembers that the disease is established in something like 50 per cent. of the dairy cows in the country, that with a lowered resistance the disease may spread at any time and convert a case of " closed " and comparatively harmless case of tuberculosis into an " open " and harmful one, then one realises the difficulty of the proposition, and the vast amount of work that will have to be carried out if the extra powers given by the Tuberculosis Order are to be taken advantage of.

The Tuberculosis Order is, I hope, a start in the right direction, which will be followed by further legislative measures which will help in the production of a tubercle-free milk supply, and will encourage farmers to establish tubercle-free herds.

The infection of milk with tubercle bacilli is natural when the animal is affected with tuberculosis of the udder, or may occur indirectly through contaminated fæces, or when in open tuberculosis of the lungs the bacteria get into the milk through the air or contaminated straw ; also in cases of generalised tuberculosis where the udder is not affected. It appears, however, that in spite of generalised tuberculosis, when tuberculosis of the udder is not present, tubercle bacilli are not usually secreted in the milk ; but the fact that the milk may at any time become infected should be given consideration.

Clinically, tuberculosis of the udder is manifested by nodular swelling or hard enlargement of the affected quarter or quarters and with enlargement and painless swelling of the supramammary lymphatic glands. These changes develop very slowly, and the milk from such infected quarters may for weeks contain numerous tubercle bacilli without the udder indicating any special lesions and without the milk showing any noteworthy change, either as to quality or quantity.

The elimination of tubercle bacilli from our milk supply may be carried out—

(1) By establishing tubercle-free herds.
(2) By a regular system of dairy inspection, combined with milk sampling; slaughter of all "open" cases of tuberculosis and improvement in the construction and ventilation of the sheds.
(3) By pasteurisation or sterilisation of milk.

The first method is the ideal one. The method chiefly used in establishing tubercle-free herds is Bang's method. This consists of the elimination of clinically recognisable diseased animals, the separation of reacting from non-reacting animals, and the rearing of calves on milk free from tubercle bacilli.

It is important that animals reacting to the tuberculin test should be immediately separated and isolated from animals that pass the test, and animals in the reacting group, which after a time become affected so that they show definite clinical symptoms, should be slaughtered as soon as possible. Calves from the reacting herd should be placed with the non-reacting herd. All young stock and the free herd should be tested every six months and any reactors immediately removed. The results of Bang's eradication method, if carefully carried out, are remarkably satisfactory and economical.

The great difficulty in this method is the complete isolation of reactors from non-reactors. It really needs two separate lots of buildings, which are not always available. By this method the reactors need not be got rid of at once—the herd is gradually built up with non-reactors and the reactors gradually eliminated, and so the total milk supply does not vary much. Before introducing fresh cows into the herd, they should be submitted to a tuberculin test. Young heifers usually give a good percentage of passes.

A point that arises in this connection is that these reacting cows can be sold in an open market without anyone knowing that they are reactors, thus they are passed on to other herds unless sold fat for slaughter. This is not a desirable occurrence, but one which we cannot prevent as the law stands at present.

The second method is quite good as far as it goes. It would remove all the immediately dangerous tubercle-infected milk-producing cows. A regular and systematic inspection of dairy herds combined with legislative measures relating to the construction and ventilation of sheds, etc., would be of great assistance in obtaining a tubercle-free milk supply. At present only a few progressive Local Authorities use their authority in applying the Milk and Dairies Orders: the result is that in a few restricted areas inspection is carried out, but the greater part of the country is free from any inspection at all.

It would be a progressive measure if all Local Authorities adopted these measures. At present it is a very sore point with farmers

within an area where inspection is carried out that farmers outside that area and supplying milk to the same area can produce milk under any conditions they like.

Pasteurisation and sterilisation need no further comment; they do not remove the cause and are only preventative measures. They may play their part in the meantime, but I think our efforts should be directed more in the direction of the source of supply, to which too little attention has been paid in the past.

THE PUBLIC HEALTH (MEAT) REGULATIONS, 1924.

By C. G. ALLEN, M.R.C.V.S., D.V.S.M.,
City of Birmingham Veterinary Department.

These Regulations came into force on April 1, 1925, and provide for a better inspection of animals slaughtered for food and improved conditions of handling, transport and distribution of meat.

I intend to deal only with the most important of the many provisions provided for in these Regulations.

Part I, General. Article 2 of this part defines various terms used in the Regulations. Most of these definitions are quite clear and require no further comment. One exception is the definition of "Inspector," which according to the Regulations means the Medical Officer of Health, or any other officer of a Local Authority having under the Public Health Acts power to inspect meat. The Public Health Act of 1875 only gives this power to the Medical Officer or Inspector of Nuisances, and does not as in the Scottish Act specifically name the veterinary surgeon. It is true that the Towns Improvements Clauses Act 1847, which is incorporated with the Public Health Act 1875, gives this power to "any other officer appointed by the Council for the purpose," but the majority of Local Authorities were unaware of this, and were under the impression that a veterinary surgeon could not be appointed under these Regulations. It is to be hoped that the veterinary surgeon will in the near future be definitely mentioned as a statutory officer under the Public Health Acts, especially as the Departmental Committee on Meat Inspection recommended that he should be appointed as the "expert" Meat Inspector. A very necessary regulation is made in Article 6 prohibiting anyone suffering from an infectious disease from slaughtering animals or handling meat intended for human consumption.

Article 3 states that the Local Authority shall enforce and execute the provisions of these Regulations. Some Local Authorities are endeavouring to do so, but there are others not taking any

action. A uniform adoption of these Regulations throughout the country is a problem which presents great difficulty.

Part II. This part deals with the regulation of slaughterhouses and slaughtering. Except in the case of slaughterhouses under the control of the Local Authority notice of intended slaughter must be given three hours before the slaughtering takes place, except in cases of emergency slaughter, when notice must be sent as soon as reasonably possible to the Local Authority or directly to the Meat Inspector.

Article 9 states that if the butcher on slaughtering an animal finds evidence of disease, he shall give notice of the fact to the Local Authority. This, of course, makes the butcher responsible for the detection of disease, and is an unsatisfactory state of affairs, which cannot be remedied until more public abattoirs are provided with a subsequent reduction in the number of private slaughterhouses. Provision is made for the detention of carcases and organs for a few hours after slaughter so that they may be inspected. After the expiration of this time the carcases and organs may be removed whether they have been inspected or not. Owing to the small number of competent inspectors available and the large number of private slaughterhouses where slaughtering is taking place at irregular times, it is evident that the percentage of animals inspected will be small. The local authority should certainly make provision for the inspection of all emergency slaughter cases and cases in which the butcher has notified the presence of disease.

Article 12 states that slaughterhouses must be used only for the purposes of slaughtering and dressing carcases, especially prohibiting gut-scraping, tripe-cleaning, and the preparation of articles of food therein. This article should help in preventing the number of outbreaks of food poisoning, many of which have previously been caused by contamination with fæcal material during the preparation of foodstuffs in slaughterhouses.

Article 13 prohibits the inflation of carcases with the breath, but does not prevent inflation by mechanical means.

Article 14 prohibits slaughterhouses being used for the slaughter of any animals not intended for human food.

Part III deals with the marking of meat which has been inspected and found free from disease. The Ministry of Health, before authorising a Local Authority to mark meat, require to be satisfied that there is an adequate and competent staff of inspectors to carry out this work. Under Article 18 power is given to the Local Authority to make a charge for the marking of carcases. The carcases before being marked should be inspected at the time of slaughter when all the

offal is available. At present this will only be practicable in abattoirs where inspection is continually being carried out. Until there is a greater public demand for meat that has been inspected and stamped than exists at the present time I do not think it likely that the butcher will go to the further trouble and expense of getting his meat stamped. One advantage to the butcher is that the onus of responsibility for inherent disease is removed from the butcher to the inspector. If a uniform system of inspection is adopted it should not be necessary for meat so stamped to be subjected to a further inspection on being taken into the area of another Local Authority.

Parts IV, V, and VI are intended to secure improved methods of handling, storing, and transporting meat. Parts IV and V make provision for the protection of meat sold from stalls and shops from contamination by flies and filth.

Article 20 insists on several sanitary conditions relating to shops concerning which there has been much need for improvement in the past. Some of the provisions are vague and permit of a wide interpretation. An example is to be found in Section 5 of this article which states that the occupier of a shop shall take such steps as may be reasonably necessary to guard against the contamination of the meat by flies, and shall cause the meat to be so placed as to prevent mud, etc., from being splashed or blown thereon. Some Local Authorities interpret this to mean that glass fronts must be provided. Other Local Authorities take the view that windows are not necessary if the meat is protected by a covering of a suitable clean material. No hard and fast rule can be made; each case must be considered on its merits, and a glass front cannot be insisted on if the butcher provides adequate protection by other means. There is one custom which I hope this regulation will help to prevent, and that is the handling of meat in the shops by customers, a very common practice in lower-class shops.

Article 20, Section 6, prohibits gut-scraping, tripe-cleaning, or household washing in a shop. This is an important point, as has been pointed out under Article 12 relating to slaughterhouses.

Part VI, Article 21, makes provision for the protection of meat from contamination during transportation and handling.

The vehicle in which meat is carried must be clean, and if open meat placed therein must be covered with a clean cloth or other suitable covering. No live animal can be carried in a vehicle carrying meat. Special mention is made relating to meat-carriers: they must take reasonable precautions against contaminating the meat. "Carriers" engaged in wholesale markets or in large stores are required to wear clean head-coverings and overalls to prevent the

meat coming in contact with their heads and clothing. This article does not apply to meat packed in hampers, cases, or adequately wrapped in some stout material.

The Rural District Councils (Slaughterhouses) Order 1924, which came into force on January 1, 1925, brings the rural district slaughterhouses into line with those in urban districts as regards licensing, control, etc. This will help in establishing a more uniform system of inspection throughout the country. In the past much trouble has been caused in urban districts in dealing with the traffic in diseased and inferior meat which has been slaughtered in country districts where no restrictions have been in force.

THE CULT OF PURE MILK.

By Major A. DUFF DUNBAR, M.R.C.V.S.,
Public Health Department, London County Council.

Perhaps the time is opportune to dwell and glance at the prospective. Now that the Tuberculosis Acts, Orders, etc., are being enforced, it behoves those immediately interested, be they practitioners or inspectors, to have their " loins girt " and recognise that they are in the throes of a test of considerable magnitude and importance ; and when reckoned, it is hoped will not be found wanting.

The aspect of the profession has possibly never looked brighter from a public health point than at present, and one may be pardoned in expressing the wish and hope that members will prove themselves equal to the occasion.

In tackling the source of tubercular milk, which is the prime factor under review, one must be properly equipped with the knowledge and other machinery, and exercised with verve, otherwise the desired results will not be obtained.

By going to work in a perfunctory manner untoward and unfavourable deductions are sure to follow. The public, farmer, cowkeeper, etc., are not the ignorant persons of, say, fifteen years ago regarding tuberculosis generally.

Don't for a moment consider we know all about tuberculosis, and have nothing further to learn, for that is one of the fatal steps to success. The disease presents itself (or does not) in so many phases, that after a few years' experience one just begins to recognise one's initial ignorance. Don't form an opinion hurriedly, exert yourself to arrive at facts, which are telling; opinion does not weigh where proof contradicts. Don't be in a hurry when examining a herd, and on no account be guided by such remarks, so frequently trolled, " those cows are nearly always out of doors and must be healthy "—a most fallacious statement.

Don't be led away by the general appearance of the animals, always bear in mind that one is encountering a subtle, deceptive disease, with little or no symptoms, and which to the ordinary observer may look perfectly healthy. *Esprit de corps* now permeates, one concludes, and a beginner in public health work, if he has not had the advantage of a practical training (special training is most essential), one assumes, would add considerably to his laurels, when in a maze, to confer with a *confrère* of experience. It is not by any means derogatory, and may tend to make the "rough places plain." (It is to those that this note is addressed.)

There is a great gulf between the laboratory and the "field work," therefore "on reason build resolve," and endeavour to bridge the chasm.

Let a pure milk supply be one's motto, spare no trouble to rid your district of cows giving tubercular milk, the eyes of the public are more particularly directed to the milk supply than to the eradication of the disease (meantime, at any rate), the latter is not so imminent and is not here considered. There is useful literature on the subject of clean milk issued by The Clean Milk Society, which ought to be read by all interested; as, given clean milk, freedom from tubercle bacilli, is the culmination; and the officers concerned will have now an opportunity (long looked for) of proving their worth.

How many, one conjectures, until quite recently, have studied the milk question from a public health point?

It is within the province, be he practitioner or inspector, to demonstrate and talk intelligently on the subject of what is a clean and pure milk, and how it can be attained.

Admitted, there are many buildings that are far behind sanitary requirements, still in such premises a practically clean milk with an exceedingly low bacterial count has been produced, the secret being attention to detail. Many such examples can be cited of recent years, proving that structural alterations may not be necessary, and therefore vies with the more modern building. It is rather disturbing in this "enlightened age" (?) when it is proved that cows yielding tubercular milk are found a short time after being examined by the local practitioner. What can one say to uphold one's status, when one is met with the "glib" retort, "What is the use of these inspections when those who are supposed to know seem to know nothing about the subject"? Examples are by no means rare, one regrets to record.

Is it due to haphazard or cursory examination? Not to ignorance, one assumes or concludes! This note is suggested to obviate these, and emphasise the importance of care in every detail. There is a

popular fallacy that the bacilli cannot enter the milk unless the cow has tubercular lesions in the udder, which possibly may account for so many of these glaring errors.

Pages could be written on the practical features, but the intention here is simply to touch briefly on a few of the more salient points.

Reading articles and hearing discussions points to the view that the task before us is a simple and easy one, but unfortunately that is not so, which experience has proved.

There is little or no analogy between tuberculosis and any of the other infectious or contagious diseases within our "ken"; banish from the mind statements which are misleading and seem to be gaining currency, as vitamines, feeding, environment, open air, and so on: these have no bearing whatever on this disease. The bacilli awaits opportunity to establish their effects in the host, possibly the most important factor being exposure. (The incidence of the disease are, however, outwith the scope of these.) Take, for example, some 2,000 cows housed in London cowsheds, where tubercular milk has been unknown for the past ten years.

One concludes that before this JOURNAL is in circulation the Orders will be in the hands of Local Authorities: what their merits are one cannot foreshadow. It is to be hoped, however, that the practical work may not suffer from too much official detail with major expense and minimum of success.

It is hoped that many appointments will be made (if not already done) of whole-time or part-time officials.

For the control and suppression of tubercular milk it is not at all clear that the results of the efforts of a whole-time man can have any semblance of success. If he has to cover a large area, say a county, it is expecting the impossible, for he can do no more than make a marginal attempt. Visualise an inspector approaching a herd of, say, from sixty to one hundred milch cows, from which tubercular milk is known to have come, and seen by him for the first time, the animals, without exception, look well and healthy (which is very common), with a history, "never had an illness, milk and feed well," and udders perfectly normal. Is it not too much to expect, therefore, that "the culprit" can be found in the first, or even subsequent, visit? And if the farm be in a remote part of his district, has he time to make several visits before he can come to any sort of a conclusion?

It must always be understood that the tuberculin test is of little or no assistance in arriving at a decision as to which animal is excreting the bacilli with her milk: nor is an abnormal udder, which may mean many conditions. The palpably affected is not considered, as anyone

with an exceedingly meagre and fragmentary knowledge can detect at a glance, and is not the type of animal which needs care to be exercised nor is liable to lead to a controversy.

For the telling results which are certain to be expected by the public, one must favour the local practitioner, who ought to be appointed inspector, under rural district councils or allied bodies, and all things considered, that is, trained to the work, able to demonstrate and detect at least " acid fast " in the milk (for his own protection), and has thoroughly grasped the clean milk problem, etc.

He is working in a known area, can take frequent opportunities of keeping suspects under observation, need not be particular as to the number of visits necessary to arrive at a correct conclusion. The work should be carried out personally, not relegated to a subordinate. By such procedure tuberculosis in milk ought to be a thing of the past in, say, three months after the inception of the Orders.

The sampling of bulk milk may be continued for some time yet, and the results of the bacteriological examinations will be carefully watched.

This note is based on a somewhat varied and lengthy experience, and on unbiassed observations " in the field," over an area of some thirty counties in England, and it is hoped, therefore, may be of some little service.

EXAMINATION OF MILK.

By E. J. BURNDRED, M.C., M.R.C.V.S., D.V.H.,
Veterinary Officer to the Municipality of Blackburn.

In this country, with the exception of a few progressive towns, practically the only attempt to ensure a pure milk supply for the public is to take samples of milk under the Sale of Food and Drugs Act and submit them to the Public Analyst for examination. He examines them for fat content and total solids, and issues a certificate stating whether in his opinion the samples are genuine or not.

In a few cases he will also certify that the milk contains so many parts of dirt per 100,000 parts by volume.

It is true that under the Dairies, Cowsheds and Milkshops Orders it is unlawful for milk from a diseased cow to be mixed with other milk (disease includes tuberculosis of the udder), under the Milk and Dairies (Amendment) Act of 1922 it is an offence to sell tuberculous milk, and under the Milk (Special Designations) Order 1922 grading is recognised; but taken generally, no attempt is made to administer these Orders, and consequently no real attempt is made

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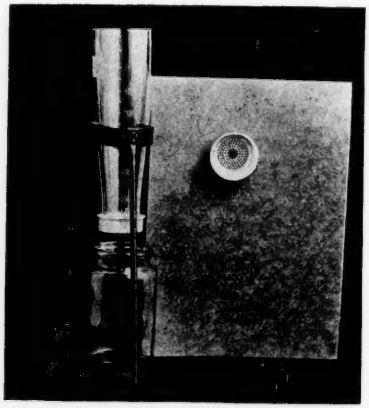
to ensure that the bulk of the milk supply of this country is pure and fit for human consumption.

The new Tuberculosis Order, and the Milk and Dairies Act, which come into operation on September 1st, will do much, if properly administered, to reduce the amount of tuberculosis milk produced and sold; but much of the gross contamination will still remain unless a much more thorough inspection of premises and methods is instituted and samples of milk are examined regularly for the presence of contamination. The time has not yet arrived when bacterial counts and examinations for the presence of *Bacillus coli* will be routine, but in the meantime a most useful and simple test for the presence



of visible dirt, which is so often manurial, may be provided by the use of cotton-wool discs.

The apparatus required consists of a glass container for the milk, the bottom end of which is covered with a perforated disc on which the cotton wool disc is fixed. The milk to be examined is poured into the container and filters through the disc. When the milk has drained, the cotton-wool disc is removed and dried on white blotting-paper, and can afterwards be cut out and mounted for future reference. As a rule the milk passes rapidly through the disc, but in certain abnormal conditions it takes a considerable time to filter.

Microscopical examination of the sediment may be made and much useful information obtained.

In districts where farms are scored, the discs give additional information for the score-card, and in any case they act as a preliminary guide in the inspection of farm and dairy premises.

MEAT AND MILK INSPECTION.*

DR. HOWARTH, in his able Report for 1924, states as follows:—

EXAMINATION OF MILK.

From the following statement of results obtained since 1904 it will be seen that the improvement indicated by the decrease in the percentage of tuberculous samples shown in 1922 and 1923 has not been maintained.

Year.	Percentage showing Tuberculous Infection.	Year.	Percentage showing Tuberculous Infection.	
1904	7·7 per cent.	1915	8·5 per cent.	
1905	9·1 ,,	1917	4·2 ,,	
1906	8·0 ,,	1919	14·8 ,,	
1907	8·3 ,,	1921	24·2 ,,	1st series.
1st series } 1909	12·5 ,,		26·3 ,,	2nd ,,
2nd series }	4·7 ,,		12·5 ,,	3rd ,,
1910	6·25 ,,	1922	9·5 ,,	
1912	6·6 ,,	1923	2·6 ,,	
1913	10·4 ,,	1924	12·8 ,,	
1914	10·2 ,,			

TUBERCULOSIS IN MILK.

Whilst the information obtained as a result of sampling at railway stations was under consideration, the Sanitary Committee instructed me to ascertain the results which certain other Authorities had obtained when examining milk bacteriologically. Through the courtesy of the respective Medical Officers of Health, the following information was obtained. It will be seen that marked variation is shown. The percentage in the City for 1923 is similar to that recorded in the area of the London County Council for 1922, but the results for the latter area have almost invariably been lower than the results in the City. One positive conclusion which can be drawn from these figures is that the presence of tubercle in milk is still far too prevalent an occurrence.

Caseous Lymphadenitis in Sheep Carcases.—Caseous lymphadenitis is the name given to a condition which resembles tuberculosis, but from which it differs in certain important respects. It is also known as pseudotuberculosis, and mainly affects sheep, although it is said to have been found in cattle, calves, guinea-pigs, rabbits and chickens.

True tuberculosis is a condition of extreme rarity in sheep, and I confess to having never seen a case. Pseudotuberculosis, on the

* Abstract from the combined Report of the Chief Medical Officer, and the Veterinary Surgeon and Chief Meat Inspector, of the City of London, for 1924.

other hand, is extremely common in certain countries, though not in this. The disease is found in meat inspection work, chiefly in imported carcases, and the lesions are discovered in the lymphatic glands.

During the present year reports from the Veterinary Surgeon at Smithfield have been forwarded to me which indicate that lesions of caseous lymphadenitis are unduly prevalent among sheep carcases received from Argentina. The total number of carcases found infected with this disease for the nine months ending September 30, 1924, was eighty-eight. This is not a large number compared with the total number of carcases received, the equivalent weight of which was over 70,000 tons, but it should be remembered that these lesions in the frozen carcase are not discovered except on cutting up, and it may, therefore, be assumed that carcases presenting these lesions have escaped the vigilance of the Smithfield inspectors, with the result that they have reached retail shops.

Mr. Young reports that it is interesting to note that your inspectors do not discover these lesions with anything approaching the same frequency in Australian sheep carcases, although the disease is not uncommon in Australia, and he was informed by Captain Grant, Veterinary Officer for the Australian Government, that all carcases of adult sheep are carefully examined at the time of slaughter by palpating the lymph glands in the prescapular, precrural, and superficial inguinal regions. This examination always reveals any lesions present, and is worth considering in connection with the above recommendation.

Instruction in Meat Inspection.

"It would be of considerable advantage to the community, and to lay inspectors of meat in particular, if local authorities having charge of local markets or public abattoirs could arrange for definite demonstrations to be given at intervals, at which not only inspectors in their employment, but also inspectors from a considerable surrounding area might attend."

In the above words the Report of the Departmental Committee on Meat Inspection emphasises the desirability of local authorities, in whose districts the necessary facilities exist, using such facilities for educational purposes.

The opportunities which Smithfield Market offers for educational work of this nature are unequalled, and accordingly, at the end of 1922, a course of what might be termed trial lectures, having in view the object suggested above, was arranged. These lectures were so

well attended that the Corporation have determined that the opportunities available should be utilised as much as possible and the educational work placed on a systematic basis. A course of lectures dealing with meat inspection problems which are encountered in the wholesale and retail markets and in shops has been arranged. The lectures, which will be essentially of a practical nature, will be somewhat out of the ordinary groove of instruction which is given for purely examination purposes. No charge is to be made for attendance.

Lieut.-Colonel T. Dunlop Young, O.B.E., M.R.C.V.S., D.V.S.M., in his Report states :—

The Board of Trade returns for the year ending December 31, 1924, show the amount of refrigerated produce which was imported into this country. The figures are as shown in table on page 466.

The imports of live-stock for twelve months, 1924, were as follows :—

	Cattle No.	Sheep No.	Pigs No.
United States	1,859	—	—
Canada	76,978	—	—
Irish Free State ..	931,614	584,857	234,535
Other Countries ..	740	4,250	—
	1,011,191	589,107	234,536

CENTRAL MARKETS, SMITHFIELD.

The quantity of supplies which passed through the Central Markets, Smithfield, during 1924, constituted a new record, the figures being 480,520 tons against the maximum of 470,401 tons in 1923, or an average of approximately 1,900 tons daily. On one day prior to Christmas the amount of food supervised by the inspection staff was 5,000 tons.

British Meat.—There was an increase of 511 tons of British beef and veal, the majority of which was of excellent quality, and was sold at high prices, but again a large percentage was found to contain lesions of disease, thus proving a continued lack of any systematic efficient meat inspection throughout the country.

Argentina.—This country which supplied approximately 75·0 per cent. of our beef and 18·7 per cent. of our mutton and lamb, maintained its high standard for the quality, grading, dressing and cleanliness of meat exported.

Again this year numbers of diseased quarters of beef were observed, the lesions being generally confined to deep-seated lymphatic glands. 126 quarters of beef (24 fores and 102 hinds) were destroyed for tuberculosis compared with 59 quarters (13 fores and

46 hinds) for 1923. A noticeable feature during the year was the number of sheep carcases which contained lesions of caseous lymphadenitis. Hitherto, in meat inspection, it has generally been considered that the lesions of this disease were confined to organs, or to

Refrigerated Produce Imports.	Exporting Country.	Weight for 12 Months, 1924.	Value for 12 Months, 1924.
			£
Beef, chilled (cwt.) ..	U.S.A.	—	—
,, ,, ..	Uruguay	528,404	1,121,393
,, ,, ..	Argentina	7,763,336	17,723,465
,, ,, ..	Other Countries ..	15,536	34,765
Beef, frozen ,, ..	U.S.A.	79,991	254,300
,, ,, ..	Uruguay	469,005	909,541
,, ,, ..	Argentina	2,222,149	4,578,495
,, ,, ..	Australia	750,937	1,490,027
,, ,, ..	New Zealand ..	564,866	1,055,764
,, ,, ..	Other Countries ..	139,621	318,841
Mutton, frozen ,, ..	Uruguay	231,468	695,411
,, ,, ..	Argentina	1,581,458	5,344,212
,, ,, ..	Australia	452,344	1,960,439
,, ,, ..	New Zealand ..	2,402,786	10,101,750
,, ,, ..	Other Countries ..	310,562	1,003,224
Pork, frozen ,, ..	China	—	—
,, ,, ..	U.S.A.	169,880	734,275
,, ,, ..	Argentina	1,445	4,916
,, ,, ..	Other Countries ..	29,926	123,556
Rabbits, frozen,, ..	Australia	133,541	299,096
,, ,, ..	New Zealand ..	8,189	18,245
Poultry (cwt.) ..	Irish Free State ..	88,852	504,494
,, ,, ..	U.S.A.	31,933	242,616
Game..	All Countries ..	15,616	82,494
Butter (cwt.) ..	U.S.A.	35,015	342,463
,, ,, ...	Argentina	538,754	4,425,502
,, ,, ...	Irish Free State ..	461,311	4,111,402
,, ,, ...	Victoria	325,188	2,849,830
,, ,, ...	New S. Wales ..	130,224	1,134,124
,, ,, ...	Queensland.. ..	174,656	1,417,257
,, ,, ...	New Zealand ..	1,086,667	10,003,108
,, ,, ...	Canada	131,374	1,269,186
Cheese ,, ...	U.S.A.	18,110	86,043
,, ,, ...	Australia	46,785	208,630
,, ,, ...	New Zealand ..	1,479,842	6,845,472
,, ,, ...	Canada	1,005,985	4,688,835
Eggs (gt. hun.) ..	Egypt	1,624,688	860,741
,, ,, ...	U.S.A.	135,394	118,518
,, ,, ...	Canada	271,731	247,927
,, ,, ...	China	1,062,077	681,108
Bananas (bunches) ..	—	11,307,940	5,500,628

the lymphatic glands of carcases, but lesions were found in the bone and muscles in addition to lymphatic glands. The majority of the lesions could have been detected at the time of examination in the abattoirs by palpation of the lymphatic gland region, e.g. prescapular, precrural, and inguinal. A total of 117 carcases were destroyed due to this disease.

Australia.—The quality, grading and dressing of Australian beef were, with exceptions, still far from being in the same class as Argentine beef. The improvement shown in dressing, mentioned last year, was not, except for a few consignments, which were well dressed, maintained. Some of the consignments arrived with the " bloom " gone from the beef. This was probably due to opening hatches to add to the cargo. If so, this should be carefully avoided, as chambers should never be opened after loading until opened for discharge. Many of the quarters of beef were from aged cattle, apparently seven years old ; such meat can never compete with meat from cattle two to four years of age. The splitting of the ischiopubic symphysis and the dressing of the buttocks were very imperfectly performed. Those defects detracted very much from the appearance of the meat. The carcases of mutton and lamb were better dressed than the beef, but many of the carcases were those of old ewes, due no doubt to the tendency to retain sheep as long as possible " for wool," very high prices being realised for this commodity ; but just as beef from aged cattle cannot compete with that from young cattle, so mutton from old sheep will never establish a good name for Australian mutton in Smithfield Market. A small consignment of meat, treated by the " Bullot Process," arrived, but it did not find favour with those who saw it. Some of it was " bone tainted." The inspection of Australian meat was, as usual, good.

New Zealand.—Beef from this country was a negligible quantity, generally from old cows and very badly dressed. A considerable quantity of veal arrived. This was of medium quality and the dressing not very well done. The carcases of mutton and lamb were, as usual, well dressed, of good quality and well graded. Those necessary conditions, coupled with a regulating of the quantity to arrive, maintained prices at a high average throughout the year. The inspection in New Zealand was, as usual, good.

Holland.—The quality, grading and cleanliness of meat sent from Holland was, as usual, of a high standard. Holland takes pride of place for depositing in Smithfield the right type of pig carcase, e.g. apparently a cross between the " Middle " and " Large " White types, from which there is derived, what the butcher desires, viz. a long back and loin and short plump legs from a pig which arrives

quickly at the desired weight suitable for the market. Any British farmer intending to begin pig breeding and feeding should visit the market at Smithfield and take this type as a model. The number of carcases destroyed as unfit for food was small, when the quantity sent is taken into consideration, e.g. Holland consignors deposited in the Smithfield Market, on Christmas week, 25,000 pig carcases in twenty-four hours.

Canada.—A quantity of "chilled" beef and a small quantity of "chilled" lamb arrived from Canada; unfortunately, most of the beef was from young cows, and the agents stated that they understood a loss was sustained on the attempt to establish a trade in "chilled" beef. It appears that it is more profitable to send the animals alive to Birkenhead and kill them there. The meat from those animals need not be labelled "imported" when offered for sale in a butcher's shop.

Unsound Meat, etc., removed from Cold Stores for the year 1924 equalled 72 tons 5 cwt. 2 qrs. 4 lb.

Leadenhall Market and City Shops.

These have been systematically inspected during the year, and the total weight of unsound food destroyed for the year 1924 was 27 tons 16 cwts. 3 qrs. 6 lb.

Tuberculosis.

Of the 40,058 bovines (all sub-divisions), 183 or 0·45 per cent. showed lesions of tuberculosis. An analysis of the records shows that the percentage of animals with tuberculosis was:—

Bulls	4·40 per cent.
Calves	0·04 ,,
Cows	28·00 ,,
Heifers	3·10 ,,
Oxen	2·00 ,,

In observations on the extent of tuberculosis in young calves it is interesting to note how extensively they may be affected and how the situation of the lesions vary. In order to show which organs are most commonly affected with tuberculosis, and also where lesions are most commonly found in carcases and their lymph glands, an analysis has been made with reference to the carcases and organs of cows, all of which were under nine years of age, and other cattle, all of which were under six years of age, *vide* the following Table.

CARCASES AND ORGANS SHOWING LESIONS OF TUBERCULOSIS.

	Cows (79 affected).		Other Cattle (90 affected).	
	No. of Animals showing Lesions.	Percentage.	No. of Animals showing Lesions.	Percentage.
Organs—				
In head glands (retropharyngeal) ..	49	62·0	49	54·4
In tongue glands (submaxillary) ..	37	46·8	23	25·5
In lungs glands and/or substance ..	71	89·9	75	83·3
In livers glands and/or substance ..	52	65·8	43	47·8
In pancreas glands and/or substance ..	45	56·9	26	28·9
In heart (pericardium)	15	19·0	1	1·1
In heart (epicardium)	Nil.	Nil.	Nil.	Nil.
In stomach glands and/or peritoneum	40	50·6	4	4·4
In spleen glands and/or peritoneum ..	28	35·4	2	2·2
In mesentery glands	54	68·3	36	40·0
In kidneys	12	15·2	3	3·3
In mammary glands (udder)	23	29·1	Nil.	Nil.
In supra-mammary lumph glands ..	25	31·6	Nil.	Nil.
In uterus	4	5·1	Nil.	Nil.
Carcases—				
In pleura	42	53·2	13	14·4
In peritoneum	40	50·6	2	2·2
In popliteal lymph glands	Nil.	Nil.	Nil.	Nil.
In ischiatic lymph glands	Nil.	Nil.	Nil.	Nil.
In precrural lymph glands	7	8·9	2	2·2
In inguinal lymph glands	Nil.	Nil.	Nil.	Nil.
In iliac lymph glands	35	44·3	3	3·3
In lumbar lymph glands	24	30·4	Nil.	Nil.
In renal lymph glands	26	32·9	4	4·4
In supra-renal bodies	2	2·5	Nil.	Nil.
In dorso-costal lymph glands	26	32·9	2	2·2
In supra-sternal lymph glands ..	18	22·8	7	7·8
In prepectoral lymph glands	31	39·2	3	3·3
In prescapular lymph glands	16	20·2	2	2·2

The amount of tuberculous meat seized at the Central Markets during 1924 was 75 tons 15 cwt. 1 qr. 6 lb.

THE BRITISH BACON PIG AND THE TUBERCULOSIS QUESTION.

By D. J. ANTHONY, M.R.C.V.S., D.V.S.M.,
Veterinary Inspector to Marsh and Baxter Ltd., Brierley Hill, Staffordshire.

At present there are recognised in this country twelve breeds of pigs, and from these are possible some 132 different first crosses. The variations in both shape and quality of sides of bacon resulting from these breeds and their numerous crosses form a serious deterrent to the sale of English produce in this country.

In Denmark only two breeds of pigs are kept, " the Large White Yorkshire " and the native " Landrace." By the judicious mating of these two strains the Danes produced a bacon pig with which some thirty years ago they set out to capture the English bacon trade.

The extent to which they have been successful in this enterprise is shown by the fact that in 1922 £17,000,000 worth of bacon alone was exported from Denmark for sale in England (representing about 80 per cent. of the Danish production).

Uniformity must therefore be an outstanding feature in a British bacon pig if it is to compete successfully with the Danish product, and the ideal characteristics of a good bacon pig may be summarised as follows :—

Age : about nine months. *Weight :* About 200 lb. dead weight. *Head and Jowls :* Head of medium length, straight face free from wrinkles ; jowls not heavy. *Neck :* Slender and free from mass of coarse thick fat above. The amount of subcutaneous fat in region of the shoulder should not exceed 2 to 2½ inches in thickness, as a mass of fat here is of little commercial value. *Shoulders :* Light, free from coarseness, and in alignment with foreleg below, and with side as viewed from the front. *Back :* Long, level, and slightly arched transversely above shoulders. *Loin :* Muscular and free from ridges of heavy fat. *Belly :* Thick, with straight underline. *Hams :* Well developed, deep, full to hocks and giving a tense appearance. (There are two rolls of coarse fat which sag down between the hams of many pigs. This defect gives rise to badly shaped hams.) *Tail :* Set high with no depression at root. *Legs :* Straight, firm, and set well apart. *Feet :* Small and compact ; the pig should stand well up on the tips of its toes. *Skin :* Fine, and covered with fine, long, silky hairs. *Colour :* White.

There should be a generous proportion of lean meat throughout the carcase. The presence of " seedy-cut " is very undesirable, and any tendency in this direction is always obviated by the use of a white sire. Seedy-cut is invariably present amongst farrows by black boars.

The breeds most nearly approaching the foregoing standard are

the " Welsh " and the " Large White Yorkshire," while experienced bacon curers maintain that first crosses give by far the best results, and they recommend the following :—

1. Large White on Middle White.
2. Large White on Welsh.
3. Large White on Large Black.

Most bacon pigs to-day are reared in the dairy districts of this country. The extraordinary feeding properties of separated cows' milk and whey were recognised by pig-owners centuries ago, and so well known are the beneficial effects which it has upon the quality of the carcase that " milk-fed pork " has become a household expression. The addition of milk to a cereal diet for pigs increases the feeding value of that diet out of all proportion to the amount of milk added, but unfortunately, owing to the prevalence of tuberculosis amongst dairy herds, milk also serves as a vehicle for infecting pigs with that disease.

The pig is of course susceptible to infection by the three types (human, bovine, and avian), of tubercle bacilli. The chief cause of pig tubercle is undoubtedly the bovine type of tubercle bacillus, and next in importance as a cause comes the avian bacillus. Undoubtedly the majority of tuberculosis in the pig is caused by the bovine type of bacillus ingested with the milk in the ration. Danish authorities have reported serious outbreaks of tuberculosis among swine due to the avian tubercle bacteria. It can be confidently asserted that about 7 per cent. of British bacon pigs reared in the dairy districts are infected with tuberculosis, and on inquiry of the breeder as to the feeding of pigs found on post-mortem examination to be tuberculous, one invariably finds that the pigs have been fed on raw cows' milk or milk products.

The presence of a cow excreting tubercle bacilli in the milk, urine, or manure, is a source of great danger to the pig population of a dairy farm. Just as in the case of human beings the preponderance of children suffering from surgical tuberculosis are found to come from country districts, so in the pig population the majority of tuberculous bacon pigs in this country are derived from farms in the dairy districts, whilst the " home fed " cottager's pig is comparatively rarely found affected with tuberculosis, as milk is not usually included in his ration.

Of the English counties, Cheshire, Yorkshire, and the Eastern Counties are the largest producers of bacon pigs, and they also provide the highest percentage of tuberculous pigs. Irish pigs are remarkably free from this disease, with exception of those pigs reared in parts of Ireland where the manufacture of milk products forms one of the chief industries. The pig population of Great Britain is somewhere in the

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neighbourhood of 3½ million, and of this about 250,000 at least are tuberculous.

Tuberculous pigs in this country represent an annual loss of about £1,000,000. That sum added to the annual loss on tuberculous cattle, to say nothing of the waste of human life due to the bovine tubercle bacillus, presents an unanswerable case for the eradication of the tuberculous cow, and any veterinary surgeon called upon to advise regarding the feeding of pigs, should, where cows' milk forms part of the ration, insist on the necessity of boiling the milk before giving to the pigs, unless it is definitely known that the cows from which it was obtained are free from the disease.

As the pig is susceptible to infection by the three types of tubercle bacilli, it is necessary to take precautions against contamination of feeding utensils and food by tubercular human beings, and where poultry are kept on the same premises they should be prevented from contaminating ground frequented by pigs. In certain parts of Denmark it is forbidden to keep poultry, cattle, and pigs together on the same farm.

Tubercle lesions in bacon pigs may vary from the tiniest tubercles to extensive areas of large organs. Lymph glands frequently enlarge and undergo cheesy or calcareous degeneration. Tubercular masses of various sizes may also sometimes appear upon the lining membranes of the chest and abdominal cavities, and upon various internal organs. Cheesy abscesses may appear in the depth of soft organs. Bones and joints are sometimes involved. In the case of joints, the shoulder and stifle joints appear to be the ones most often affected, but generalised tuberculosis with emaciation is not a common condition met with in the examination of bacon pigs.

Undoubtedly by far the commonest seat of tuberculous lesions in the bacon pig is in the submaxillary lymph glands. Often these are considerably enlarged and calcareous. Contrary to what is the case in the ox, the pharyngeal glands are not found affected so frequently as the submaxillary glands.

Next in frequency after the submaxillaries come the bronchial, portal, and mesenteric lymph glands. In castrated hogs one occasionally finds one or more inguinal glands affected, but with no trace of tuberculosis in any other part of the carcase or organs; here presumably the infection was *via* the castration wound.

It is invariably found that if the bronchial glands are tuberculous, so also are the portal glands.

As a means of eradicating the disease from a herd of pigs the intradermic tuberculin test is useful, combined with measures directed against infection from cows, poultry, and human attendants.

Personal

We read in the *Journal of the Australian Veterinary Association* that the ladies have now invaded our profession in Australia, and that the first one to become qualified as B.V.Sc., Miss M. G. Keats, has been appointed by the Governments of New South Wales and Victoria as Border Inspector of Stock at Gon Crossing on the Murray River. Miss B. Reid, of Victoria, who spent some time in England a few years ago, was really the first lady to obtain an Australian Veterinary Diploma, but to Miss Keats belongs the honour of being the first lady to obtain the University B.V.Sc. degree. We congratulate her not only on this but also on the fact that she has been officially recognised by being allotted a Government position.

The July issue of the *Cavalry Journal* contains a most interesting exposure of "Horsey Fallacies" as they present them to the mind of the average "know-all." The author of the article, Major T. Lishman, a retired officer of the R.A.V.C., does good propaganda work for the profession by fearlessly exposing certain stupid and fallacious ideas on such things (amongst others) as "lampas," "colic," and the watering of horses; and, as the *Cavalry Journal* is largely read by officers who have command of animal units in health, there is every reason to hope that the remarks will not be wasted, and that the seed thus sown will fall upon good ground.

Sensible practical articles in lay papers, when written by those who are masters of the subject, cannot fail to bring forth good results; equally upon the objects under discussion and upon the profession to which the author belongs. We trust that this article is only the precursor of a number of others of a similar kind from the pen of Major Lishman or one of our Army colleagues.

The profession is waiting with more than ordinary interest for the result of the selection of the candidate to fill the William Prescott Chair of the Care of Animals—Causation and Prevention of Disease.

As the stipend is £1,000 a year, and the chair is one attached to a well-known and go-ahead University (that of Liverpool), the position is one of importance, and one for which there is sure to be considerable competition.

The subjects to be studied are essentially connected with animals in health and disease, and it is an opportunity which our profession must not allow to slip by, as it is a post which a scientific veterinarian is the most competent to fill. We refer our readers again to the Editorial of the August issue.

Mr. J. Ewing Johnston, M.B.E., M.R.C.V.S., the President of the North of Ireland Veterinary Medical Association, has been elected a Justice of the Peace for the City of Belfast.

The Harveian Society has recently elected Professor F. T. G. Hobday to be an Honorary Member. This Society was originally formed in 1831

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in memory of Dr. Harvey, the noted discoverer of the circulation of the blood, and its present President is Sir John Broadbent, Bart., M.D. The number of Honorary Members is limited to twelve.

Notice

ANTIPHLOGISTINE.

ANTIPHLOGISTINE, as an agent which has all the soothing and sedative effects of a warm poultice without any of its messy, soon-grow-cold, properties, has become a household word in veterinary practice, just as much as it has become an indispensable adjunct in human therapeutic medicine.

In cases of contusions, in swollen or sprained joints and tendons in all animals—horse, cow, dog, cat, and even the pig—its soothing influence is speedily manifested by the comfort and ease from pain which its external application gives ; and in cases of pneumonia or other chest troubles, or in peritonitis, it is invaluable.

Apart from its advantages over hot fomentations or poultices, from the point of view that, when applied properly and covered by a bandage or piece of oilskin, it will retain its warmth for an almost indefinite period. The saving of time and trouble to the attendant is an item of considerable moment in these days of attempts at labour saving.

The Denver Chemical Manufacturing Company, 41 St. Ann's Road, London, E. 3, will be pleased to send samples and literature to any member of the profession upon application.

TUMOURS OF THE TESTICLE.

Mr. H. W. B. Cairns, F.R.C.S., of the Pathological Institute, London Hospital, E. 1, will be obliged if members of the veterinary profession will send him specimens of testicular tumours of animals to the above address. They should be preserved in formalin solution, and the expenses of carriage, etc., will be gladly defrayed.

R.A.V.C. Old Comrades Association, Fifth Annual Re-union Dinner, Anderton's Hotel, Fleet Street, E.C., on the 23rd of October, 1925, at at 7 p.m. Tickets 5s. 6d. each from Secretary, c/o R.A.V.C. Records, The Common, Woolwich.

Back Numbers.—The publishers desire to purchase certain back numbers of the JOURNAL.—See Advertisement on page xxii.